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## This Week in The IRON AGE

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February 22, 1945

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# National Debt, National Income and Elementary Arithmetic

THE story is told of the difficulties encountered by a man trying to describe an elephant to another man who had never seen one. Biggest animal the latter had ever encountered was a jack rabbit.

Most of us cannot conceive of a billion dollars because we have never encountered more than a few hundred or at most a few thousand at a time. Thus it's hard to get a realistic picture of America's national income and national debt.

The little pictures on this page have been made by looking at Uncle Sam and his relation to income and debt through a diminishing glass, or, if you please, a reversed telescope. It shows him in 1919, after the first World War, with an income of \$2000\* per year and carrying a debt of \$825. We thought that was awful at the time.

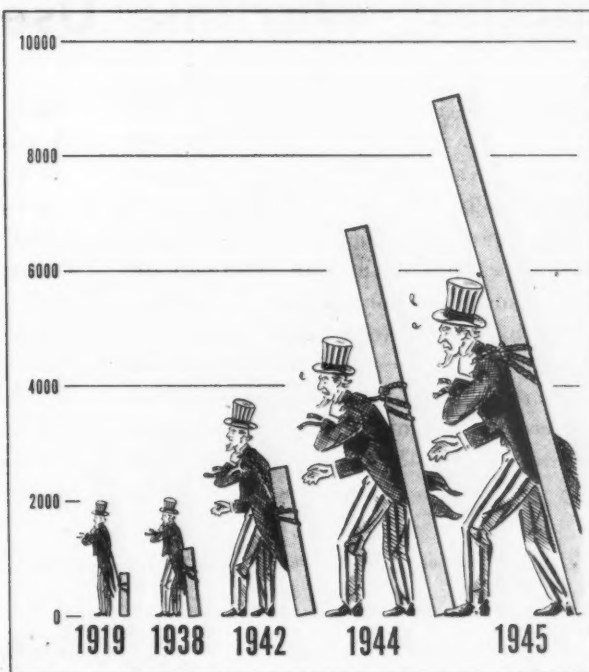
Uncle Sam's income by 1938 had reached an identical amount, namely \$2000, but thanks to the depression or the New Deal, or what you may call it, he was dragging a debt load of \$1340. Which goes to show that war may not be as hellish as is its aftermath.

Uncle Sam has prospered since, if you forget his debts and look at his income. In 1942 for example, he was earning \$3650 per year in terms of national income. But his debt load had risen to \$2450.

In 1944, his annual pay was raised to \$4950, which made him feel that he had the world by the tail until he looked over his shoulder and saw his debt load of \$6460. Prospects for 1945 are that he will get another pay rise to \$5750, but that he will be dragging around a mortgage of \$9600.

All of which raises the question: From where is he going to get the money to buy that new car or refrigerator after the war unless he does some compromising with his creditors?

\* The \$2000 per annum income, assumed for Uncle Sam in 1919, is not the average income per person but a round figure chosen for convenience. Debt relations, however, are in correct proportion to this.



*John H. Edwards*



## Spheroid Floats— Another Wartime Use of Inland Steel

Guarding America's great harbors is a small Navy within the Navy—the men and tenders who handle the antisubmarine and antitorpedo nets. These nets, often more than two miles long, are supported by spheroid floats. A great number of these floats, which are 58 in. in diameter, are made by welding together preformed segments that are cut from Inland plates.

The plates shipped for this purpose by Inland not only measure up to specifications, but they are delivered on schedule, assuring uninterrupted production, low manufacturing cost, and on-time delivery of floats to the Army and the Navy.

Meeting customers' manufacturing schedules is an Inland tradition, which we have done our best to maintain even in the face of the heavy demands and changing needs of wartime production. This principle of punctuality begins when an order is taken—and follows through the order department, the metallurgical department, Inland's modern mills, and the traffic department. To Inland, every order calls not only for high uniform quality but for cooperative service as well.

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➤ Good as the Russian air force is, the motors produced in that country are not particularly modern by U. S., British, German, and even Japanese standards. Most Russian aircraft motors are liquid-cooled, although one air-cooled job goes as high as 1600 hp.

Surprisingly, no powerful and efficient V motors have been produced in the U. S. S. R., or if such motors exist they are closely guarded secrets.

➤ Lack of time is the usual reason given for failure of the Germans to destroy much of the French and Belgian industries and public utilities. However, this is a poor reason, as in many instances there was plenty of opportunity.

Considerable evidence indicates that the Germans deliberately avoided destruction to temper punitive action, now that the war is in its final phase. Paris authorities told the Germans that wrecking of Paris power facilities would result in moving of similar facilities to Paris from German cities after the war. There was no wrecking.

Antwerp was not destroyed as the Germans believed that after the war this port would be necessary for German importations, what with its own ports practically ruined.

➤ It's a close race in Europe to get Germany beaten before the economies of France and Belgium completely collapse. The lack of transportation, imports, foods and fuel, together with the industrial stagnation, unemployment and general frustration, has military authorities jittery.

➤ The Japanese have a jet propulsion plane which will shortly be introduced in combat. They are using German technicians in the development of this as well as other war weapons. As a group, Japanese planes are improving, as their shorter range requirements make possible other tactical advantages.

➤ Scrap salvaging in the Mediterranean area by the Navy is largely confined to clearing harbors of sunken vessels and vessels sunk close to shore. Prime interest is to keep shipping lanes open, and salvaged material is shipped to this country in empty vessels as ballast.

➤ In arranging for the resumption of industrial output in liberated countries for the benefit of the Allies, some factories are under direct contract with the War Department and are being run by prewar management; others are being operated as Ordnance Depots, with contracts with the finance Ministries by way of reverse lend-lease, Maj. Gen. Levin H. Campbell revealed.

At the Gnome-Rhone aircraft engine plant in Paris, where maintenance and repair work and engine rebuilding is being done, labor leaders have agreed that the urgency of production justifies three 8-hr. shifts a day, seven days a week. Before the fall of France, organized French labor was working on a 30-hr. week.

In spite of this, added inducements were necessary to keep workers on the job and Gen. Campbell arranged for the workers to get one meal a day at the factory which in view of food scarcities is certainly attractive.

➤ Commercially usable transport planes will be leased to commercial airlines in order to save them the cost of buying ships which soon will be obsolete. The Surplus Property Board has already allocated 127 out of 185 medium transports declared surplus to commercial airlines, but no deliveries of the planes have been made.

In December, 6700 planes were produced and 3862 were declared surplus while in January 6500 planes were made and 3000 declared surplus. However, planes made in current months are mostly heavy bombers and other heavier types of military ships and those declared surplus are mostly light trainers rendered surplus by curtailment of training programs.

➤ Washington discussions point up current nationwide confusion on the whole manpower question. While the possibilities of a national service act diminish, some WMC controlled plan, probably a modification of the "Allentown Plan" will be used to coerce recalcitrant workers into vital programs.

➤ Work stoppages caused by violation of established shop rules in one large automotive company have jumped from 2 in 1939 to 38 in 1944. In 1944, the study disclosed, strikes caused by discipline breakdown involved 31,496 men out of 42,917 participating in all strikes and caused loss of 898,062 manhours.



# Baked Magnesium Sand Molds

**S**AND casting of magnesium alloys has, in the past, required a considerable degree of specialization. Developments in foundry practice have been mainly concerned with the search for binders which are compatible with the volatile inhibitors that are associated with the casting of magnesium.

Magnesium foundry practice has in general been molded around sulphur and boric acid oxidization inhibitors as sand addition agents, and ammonium silicofluoride and ammonium

By G. H. CURTIS  
Sand Control Chemist,  
Dodge Chicago Plant, Chrysler Corp.

o o o

fluoborate as a spray applied to the baked core. It is common practice to use as low a temperature as possible to bake the cores in order to decrease the volatile loss of inhibitor in the core ovens. Oftentimes, this practice results in an increase of core gas con-

tent, the elimination of which is dependent on higher baking temperatures.

After baking it is necessary in many practices to spray the cores with fluorides, followed by a spray drying operation. Again, this drying operation must be accomplished at a lower temperature to prevent sublimation of the inhibitor, or at least to minimize it. Yet the drying temperature must be sufficiently high to insure a thoroughly dried core. In some foundries also it is necessary to employ "warm rooms" for core storage in order to prevent moisture pick up from the atmosphere while the cores are awaiting assembly.

When elemental sulphur is added to the molding or core sand, along with the other ingredients such as oil, clay and/or cereal flour, according to Eastwood<sup>1</sup> the sulphur vapor generated in the mold and sand adjacent to the metal is more protective than sulphur dioxide which is formed by reaction of the sulphur with the oxygen in the mold atmosphere. It is the practice of many foundries, however, to increase this protective atmosphere by flushing the mold with sulphur dioxide gas, thus replacing the air in the mold with a less reactive gas.

The use of boric acid is synonymous with the use of sulphur since the two are used in various concentrations in both green and dry sand work. The action of boric acid as an inhibitor may be explained by the formation of a non-reactive film on the sand grains, as pointed out by Eastwood; or as suggested by Blohm,<sup>2</sup> the formation of an inert gas at 375 deg. F. It is generally accepted that boric acid contributes to the amount of protection present in the mold, but is seldom sufficient in itself. In very heavy sectioned castings, even the use of these two protective agents is not always sufficient in preventing oxidation of magnesium alloys.

## Fluoride Sprays

To augment the amount of inhibitor on the surface of the core, it is common practice to apply fluorides in water solution to the core, followed by a drying operation. Some foundries find it possible to spray the cores while they are still hot from the

FIG. 1—Fractures of magnesium test blocks poured in cores containing potassium fluoborate. Bar No. 1, no inhibitor; No. 2, 0.1 per cent; No. 3, 0.2 per cent; No. 4, 0.3 per cent; No. 5, 0.4 per cent; No. 6, 0.5 per cent. Cores baked at 400 deg. F.



# Inhibited with Potassium Fluoborate

baking oven, and thus utilize the heat in the core to dry the spray.

Ammonium silicofluoride and ammonium fluoborate fluorides decompose quite readily at low temperatures and this fact necessitates care in the drying of the core to insure adequate drying with a minimum of inhibitor loss due to volatilization. Another difficulty connected with any spraying operation is to obtain a uniform distribution of fluoride on the core. This usually requires close supervision and thorough training of the operator.

The fluorides seldom are used as addition agents in core sand. Their volatility and harmful affect on core properties preclude their use in this manner, except in special cases.

## Inhibitor Problems

With most core oils available to the industry, a baking temperature of at least 400 deg. F. is required to bake out the core thoroughly. At this temperature the sulphur will volatilize in the core baking ovens, thus diminishing the inhibiting qualities of the sulphur on the surface of the core. It has been found in practice that sulphur concentrations are reduced to approximately 0.25 per cent on the surface of the core after a normal 4 hr. baking cycle.

Boric acid presents a shakeout problem to many foundrymen; and to the large foundry which reclaims the core sand thermally, the problem of burning out the core oil and cereal is made more difficult by the melting of the boric acid and the fusing of the sand grains.

A more recent development has been to find low temperature binders suitable for use with the volatile inhibitors. Urea formaldehyde type binders are being used, allowing baking temperatures of 300 to 350 deg. F. and resulting in less inhibitor loss during baking. Low temperature baking oils also have been introduced, allowing baking temperatures of 350 to 370 deg. F..

## Potassium Fluoborate

The prevention of oxidation of magnesium alloys in the mold may be approached in a different manner, that is, by the selection of an inhibi-

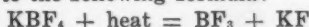
**... At Chrysler's huge Dodge Chicago plant, where Wright engines for the B-29 Superfortresses are being made in large volume, potassium fluoborate is being used successfully as a magnesium oxidation inhibitor in molding sands for the first time on a large scale. Investigations reported by Mr. Curtis indicate that the properties of the fluoborate, in regard to baking characteristics, shake out and collapsibility of the molds, are more favorable than those obtained with the use of boric acid. The fact that this inhibitor decomposes at relatively high temperatures allows greater latitude in core baking practice. It may be used as a sand addition agent, thus eliminating spraying and drying operations.**

tor with a decomposition temperature above the baking temperature of cores. An inhibitor decomposing at temperatures above 450 deg. F. and below the pouring temperature of the metal would have the following advantages:

1. Higher permissible baking temperatures
2. Uniform distribution of inhibitor, since the inhibitor may be added to the core sand mixture
3. Elimination of spray and spray drying operations.

Potassium fluoborate has a melting point of 987 deg. F., and decomposition starts at approximately 1100 deg. F.

Theoretically, it decomposes according to the following formula:



This reaction is similar to that of ammonium fluoborate except that a much greater amount of heat is necessary to accomplish the decomposition.

Results of some analytical work on samples of sand with fluoborate present, after being heated to 1200 deg. F., indicate a higher loss of fluoride

than boron, leading to the conclusion that some  $\text{SiF}_4$  also is formed when the fluoborate is heated in the presence of  $\text{SiO}_2$ .

With such a high decomposition temperature, the potassium fluoborate may be added to the core sand at the mixer without any loss in the baking operation. Referring to Table I it will be seen that the loss at 450 deg. F. is negligible compared with other fluoride inhibitors.

When potassium fluoborate is added to the core sand mixture, the workability of the green core sand is not impaired in any way, and the baked core is actually stronger than a core with no fluoborate addition. In this respect the action is entirely unlike the other fluorides.

## Pilot Foundry Tests

In order to determine the practicability of potassium fluoborate as an inhibitor, test slabs 11 $\frac{3}{4}$  in. long, 3 in. wide and 1 $\frac{3}{4}$  in. thick were cast in molds containing various amounts of the inhibitor. Fig. 1 shows the fractures of six slabs poured in

TABLE I  
Properties of Fluoride Inhibitors Used in Magnesium Foundry Practice

Inhibitor	Solubility gm./100 cc. at 25 deg. C.	Melting Point Deg. F.	Per Cent Decomposition					
			350 Deg. F.			450 Deg. F.		
			30 min.	60 min.	90 min.	30 min.	60 min.	90 min.
Potassium fluoborate.....	0.55	987	0.02	0.12	0.12	0.25	0.27	0.29
Ammonium fluoborate.....	20.3	448 Sublimes	0.17	0.71	0.93	1.08	2.07	4.37
Ammonium silicofluoride.....	18.6 (17 deg. C)	Sublimes	0.25	2.4	3.13	1.14	8.13	19.8



cores of 0.0 to 0.5 per cent fluoborate. It will be noticed that oxidation is present in bar Nos. 1, 2 and 3, the cores of which contained 0.0, 0.1 and 0.2 per cent potassium fluoborate, respectively. Bar Nos. 4, 5 and 6 have no burning present indicating that the amount of inhibitor in these cores (0.3 to 0.5 per cent) was sufficient to eliminate the oxidation.

Fig. 2 shows the fractures of bars

poured in cores containing 0.5 per cent sulphur used with various amounts of potassium fluoborate, from 0 to 0.5 per cent. Here the object was to determine if less fluoborate could be used with the addition of sulphur, and how much less. Bar No. 1, which was poured in cores containing 0.5 per cent sulphur only, contained several burned areas, indicating that the sulphur alone is not sufficient to pre-

quirements will result with the use of sulphur in conjunction with it.

### Production Tests

For the production tests of the potassium fluoborate inhibitor, a casting of heavy metal section was chosen. The wall sections of this particular casting were  $\frac{1}{2}$  to  $\frac{3}{4}$  in. thick, and it had a heavy flange section about 2  $\frac{3}{4}$  in. thick.

In Fig. 4 is shown fractured sections from two castings poured in molds containing different combinations of inhibitors. The mold for the casting represented by the fracture on the left of Fig. 4 contained 0.5 per cent potassium fluoborate. The heavily burned area (dark) indicates that for this particularly heavy section, the amount of fluoborate present was ineffectual. However, all the lighter sections are free of oxidation.

The mold for the casting shown at the right in Fig. 4 contained 1.0 per cent sulphur and 0.5 per cent potassium fluoborate. This casting was free of oxidation in all sections. The improvement in the heavy section is evident by comparison of the two fractures.

Smaller percentages of potassium fluoborate and sulphur were tried in production tests, but to no avail. The casting sections involved were too heavy to make it wise to use less inhibitor in the sand; therefore 1.0 per cent sulphur and 0.5 per cent potassium fluoborate were set as the minimum requirements for the particular work being done. The use of 1.0 per cent sulphur with the fluoborate represents a decrease of 50 per cent over the previous sulphur requirements for this casting.

The optimum amount of inhibitor must be determined by the individual foundry for the type of castings being made. The tests reported here merely indicate what may be expected by the use of potassium fluoborate in the effectiveness with which it will inhibit the oxidation of magnesium alloys.

In light-sectioned castings, the decomposition to boron trifluoride is apparently sufficient to provide a protective atmosphere over the metal and a protective film over the sand grains. In heavier sections where more prolonged protection is necessary and where core temperatures under the surface of the core are insufficient to decompose the fluoborate, sulphur will provide the additional protection necessary.

It is in the investigation of core properties that a radical difference in inhibitors is manifested. As previously stated, the ammonium fluoborate and

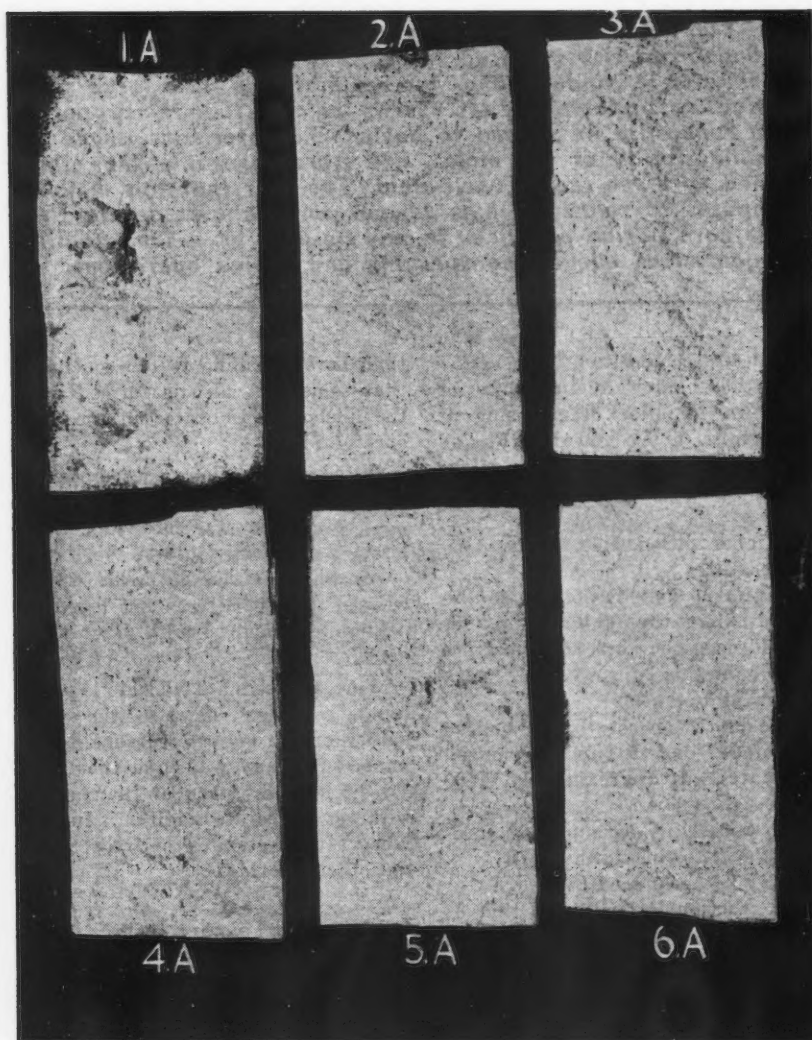


FIG. 2—Fractures of magnesium test blocks poured in cores containing the same percentages of potassium fluoborate as in Fig. 1, except baked at 450 deg. F.

poured in cores containing 0.0 to 0.5 per cent potassium fluoborate, and which were baked at 450 deg. F. A very slight amount of oxidation is present in bar No. 2A, indicating again that 0.1 per cent fluoborate is insufficient protection for this particular metal section. However, from this test it may be concluded that a higher baking temperature in no way affects the amount of protective agent in the core.

Fig. 3 shows the fractures of bars

vent oxidation in a section of metal of this thickness. However, on all other bars where 0.1 to 0.5 per cent potassium fluoborate was used, there was no indication of the oxidation.

In all the above tests, AMS alloy 4424 (6 Al, 3 Zn) was used. The bars were poured at 1450 deg. F. These tests indicate that potassium fluoborate will decompose sufficiently to provide protection to the molten magnesium. The tests also indicate that a substantial decrease in fluoborate re-



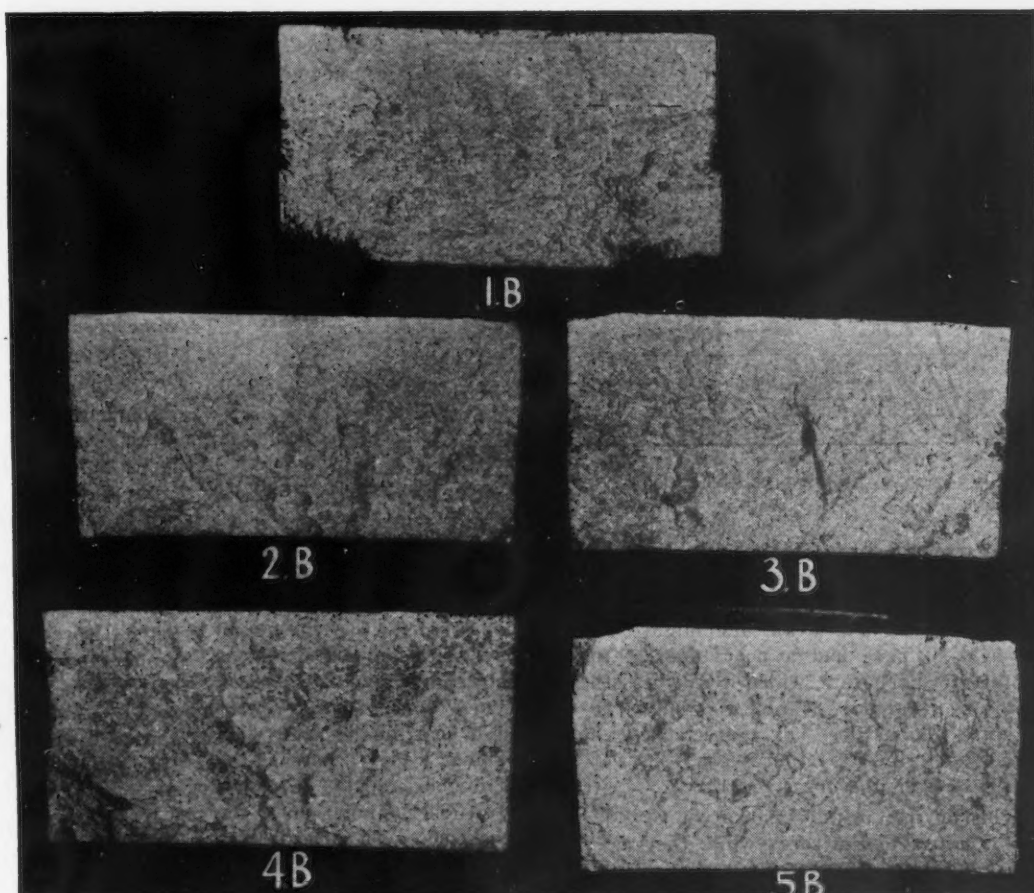
RIGHT

**FIG. 3.** — Fractures of magnesium test blocks poured in cores containing 0.5 per cent sulphur and the following percentages of potassium fluoborate; No. 1, none; No. 2, 0.2 per cent; No. 3, 0.3 per cent; No. 4, 0.4 per cent, and No. 5, 0.5 per cent.

o o o

BELOW

**FIG. 4.** — Fractures of magnesium production castings showing oxidation (left) when 0.5 per cent potassium fluoborate is used in the core sand as an inhibitor, and no oxidation (right) when 1.0 per cent sulphur is used with the fluoborate.



ammonium silicofluoride are seldom used as addition agents to core sand. Their effect on core sand is such that in percentages high enough to give protection to the metal, the workability of the sand is usually impaired. Green bond strength is deteriorated causing sticking to the core boxes and difficulty in handling the green cores. The air-dry strength of oil-cereal cores is decreased, causing either sagging of cores or collapse on the conveyor before the core reaches the baking oven.

Table II shows some of the properties of core sands containing these inhibitors in amounts of 0.5 per cent. Ammonium fluoborate decreases the

**TABLE II**  
Effect of Inhibitors on Core Properties

	Dry Compression Strength Lb./Sq. In.	Workability	Baked Tensile Strength Lb./Sq. In.
No inhibitor.....	276	Good	170
Potassium fluoborate.....	255	Good	188
Ammonium Fluoborate.....	154	Poor	91
Ammonium silicofluoride.....	47	Poor	117



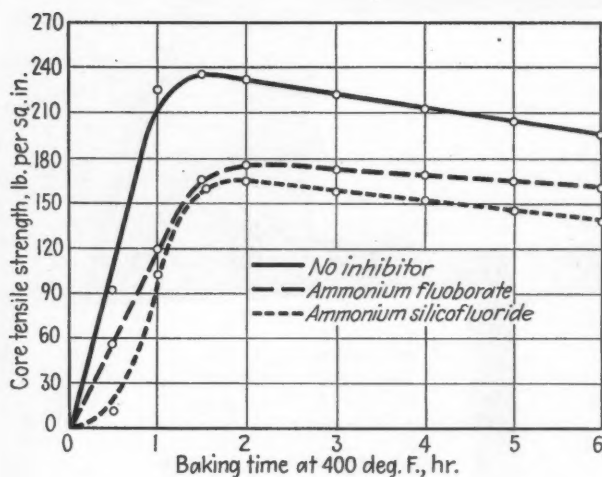


FIG. 5 — Effect of 0.5 per cent additions of ammonium silicofluoride and ammonium fluoborate on core baking characteristics.

dried strength (dried at 210 deg. F.) by 44 per cent and ammonium silicofluoride by 83 per cent. These two sands felt dry and weak, and might be said to have had a poor "feel." Potassium fluoborate, which it will be noted by reference to Table I is only slightly soluble, does not appreciably affect the green bond strength, the "feel" or even the dry strength.

This drying test is indicative of what occurs to the cores while they are air-drying on the racks previous to baking. The standard 2 by 2 in. specimen was dried in an oven at 210 deg. F. after it had been determined that there was no difference in compression strengths between the oven dried and the 4 to 6 hr. air-dried specimens. The strength developed by this drying is only that which is contributed by the cereal flour, since little strength due to oxidation of core oil may be expected at this low temperature.

The baked strength is seriously impaired by the use of ammonium fluoborate and ammonium silicofluoride, resulting in soft, friable cores, influencing the ease of assembly of cores, and increasing the possibility of sand inclusions in the casting. Fig. 5 shows the baking curves of core mixtures containing ammonium fluoborate and ammonium silicofluoride. The solid line curve is that of a control sand containing no chemical addition whatever.

The baked strength is reduced approximately 30 per cent by ammonium silicofluoride and about 26 per cent by the ammonium fluoborate. This means that a considerable additional quantity of core oil is necessary to maintain a specific baked strength. The general use of these fluorides is discharged by this softening effect on the baked core, coupled with their volatility.

Potassium fluoborate and boric acid

each has a different action on the baking of a core oil, as shown in Fig. 6. These curves represent core sand mixtures containing 0.5 per cent potassium fluoborate and boric acid as the inhibitor and with oil and cereal as the binders. The fluoborate curve shows a high peak in the early part of the baking cycle, whereas the strength of the boric acid is developed more slowly. The explanation of the shape of the boric acid curve is possibly in the physical changes of the acid and the amount of water of hydration present. This curve was rechecked with other percentages of boric acid and in every case the same typical shape of curve was obtained.

From these baking curves it may be concluded that the potassium fluoborate accelerates the baking to a considerable extent. This fact was substantiated by the production use of potassium fluoborate where it was noticed that the large, bulky cores were being baked out more completely than previously. This was especially true in the case of large cores where deep pockets were sometimes green.

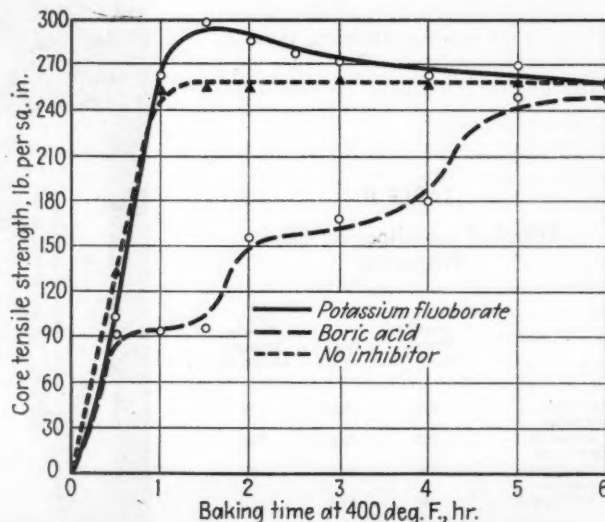


FIG. 6 — Comparison of baking characteristics of cores containing boric acid and potassium fluoborate inhibitors.

The use of low temperature oils often result in this condition, especially when ovens are being pushed to capacity and baking temperatures are low.

Laboratory investigation of the core gas in the tensile specimen at the peak of the baking curve proved that the gas is decreased by 15 per cent by the addition of 1.0 per cent of potassium fluoborate, and furthermore, the same decrease is obtained with additions of only 0.1 to 0.2 per cent potassium fluoborate.

Shakeout of boric acid cores used in magnesium core practice is known to be difficult. Boric acid very definitely hardens a core, making it difficult to remove from the casting.

### Properties at Elevated Temperature

According to Chamberlain and Peters,<sup>3</sup> core temperatures in magnesium practice seldom exceed 500 deg. F. for a ½ in. metal section. Their work disclosed that with a 1 in. section of metal, the core temperature will approach 580 deg. F. after 30 min.

Because of the extremely low core temperatures involved, the elevated temperature investigation of magnesium cores is primarily concerned with properties of the core at temperatures probably no higher than 800 deg. F. Boric acid, with a melting point of 365 deg. F. will be plastic or molten at temperatures from 400 to 800 deg. F. This will afford a bond between the sand grains and increase its resistance to deformation under compressive load. Theoretically, potassium fluoborate does not melt until a temperature of approximately 1000 deg. F. is reached. Despite the fact that the fluoborate is ostensibly in the solid phase at testing temperatures

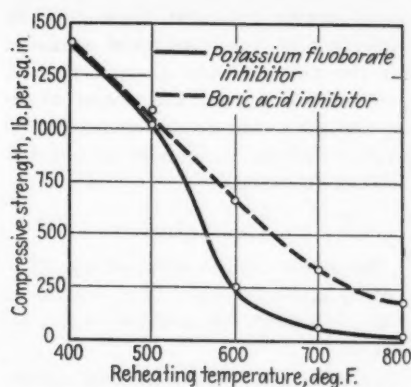


FIG. 7—Comparison of retained strength properties of cores containing fluoborate and boric acid as inhibitors.

up to 800 deg. its properties at this temperature is effected.

### Retained Strength

Retained strength may be defined as the residual strength in a baked core after being heated to specified temperatures, cooled and subsequently broken under a compressive load. For this test a standard A.F.A. specimen was used, and the baked cores were heated at various temperatures up to 800 deg. F. for 1 hr. After cooling in a desiccator, the cores were broken.

Fig. 7 presents a comparison of the effect of boric acid and potassium fluoborate as on the retained strength of cores. It is apparent from these curves that boric acid has a greater effect on the retained strength than potassium fluoborate. As might be expected, the results are related to the respective melting points of the two inhibitors.

At temperatures from 400 to 500 deg. F. there is little difference between the two agents. However, upon increasing core temperatures, the boric acid core has considerably greater strength. At 600 deg. F., for instance, the boric acid treated core is more than three times stronger; at 700 deg. F. it is four times stronger; and at 800 deg. F. it is nine times stronger than the potassium fluoborate treated core.

These results illustrate how these two inhibitors can influence the shake-out characteristics of cores. It is apparent that somewhat better results might be expected from fluoborate cores.

### Collapsibility

In some cases, particularly in thin-walled castings, the collapsibility of a core is of paramount importance. It is necessary to have a core disintegrate on the surface to provide for the expansion of the core itself and the contraction of the solidifying

metal. Lacking this property of collapsing readily, a core may cause hot cracks in the casting.

The property of collapsibility is a function of the binder used in the core and of the inhibitor. An ordinarily fast-collapsing core may be retarded appreciably by an inhibitor which melts and contributes a bonding action to resist collapse.

In investigating the relationship between the two inhibitors and collapsibility of a core, it was found that boric acid and potassium fluoborate react differently. Fig. 8 illustrates the fact that increasing the percentage of boric acid will increase the time of collapse, while potassium fluoborate will decrease the time of collapse. The maximum increase in collapse time for the boric acid inhibited core is approximately 15 per cent, and the maximum decrease in collapse time for the potassium fluoborate inhibited core is approximately 22 per cent. In the case of the boric acid, the increase in collapsing time may be explained by the fact that the acid is molten at the testing temperatures of 1200 deg. F. and thus gives the core more resistance to disintegration.

The action of the fluoborate, however, is unlike that of boric acid, because the fluoborate will melt and then decompose slightly. The decomposition product is KF, which has a melting point of 1600 deg. F. Since this is well above the testing temperature, the fluoride will be in the solid phase. The bond on the sand grains, then, will lessen as the decomposition progresses, much like the burning out of the binders.

One practical observation which

FIG. 9—Effect of boric acid on hot strength of oil-sand cores.

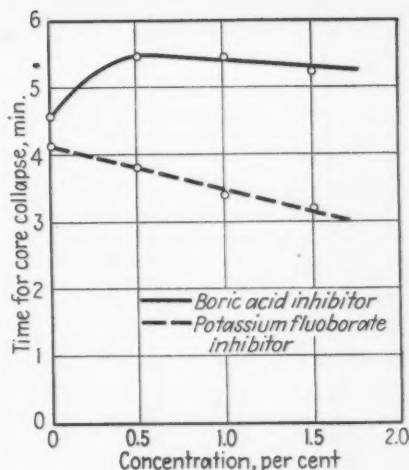
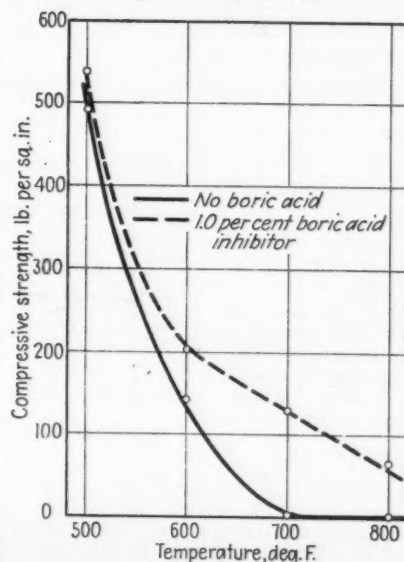


FIG. 8—Effect of potassium fluoborate and boric acid on core collapsibility at 1200 deg. F. under 25 lb. load.

will illustrate the difference between the two inhibitors is a comparison of two sands which are heated to 1200 deg. F. The boric acid treated sand, upon cooling, will contain lumps of sand grains that are extremely difficult to break up with the rubbing action of the fingers. The potassium fluoborate sand is also fused but will separate with a light touch.

Collapsibility tests were made at 1200 deg. F. because of the expediency in conducting the tests. A similar curve is obtained at lower temperatures only moved farther up the ordinate. Cores that collapse in 4 min. under a 25 lb. load will collapse in approximately 8 min. at 1000 deg. F. and in approximately 12 min. at 800 deg. At 600 deg. no collapse occurred during a 40 min. exposure period.

### Hot Strength

Figs. 9 and 10 illustrate the effect of boric acid and potassium fluoborate respectively on hot strength of cores. Potassium fluoborate increases the hot strength by 13 per cent at 500 deg. F. compared to the boric acid increase of 40 per cent. At 600 deg. the fluoborate increase is 48 per cent and the boric acid increase is 133 per cent.

At temperatures of 700 and 800 deg. F., the fluoborate sand has a strength of 20 and 25 lb. per sq. in., respectively, compared with 75 and 50 lb. per sq. in. in the case of the boric acid treated core. At these temperatures the control core, with no inhibitor, will collapse.

These tests indicate that both inhibitors will increase the effort necessary to shake out the core, although the fluoborate cores should disintegrate easier. The tests corroborate what was found in the retained strength test. While the conclusions



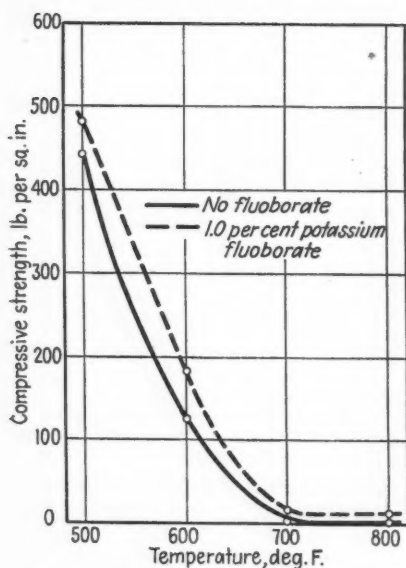


FIG. 10—Effect of potassium fluoborate on hot strength of oil-sand cores.

that might be drawn from the results are that potassium fluoborate in the core sand will make shakeout more difficult, compared with boric acid in equivalent concentration, the hardening of the core and increase in hot strength is of a lesser degree.

#### Moisture Absorption

Core absorption of moisture from the atmosphere is a problem faced by many small production foundries where cores are sometimes stored for considerable periods before their use. The reaction of molten magnesium and moisture vapor, with the formation of hydrogen, make it necessary to have dry cores in the mold when the metal is poured. The moisture absorption may be eliminated by use of dehumidified rooms for storage and by the use of binders and inhibitors which do not have the tendency to absorb atmospheric moisture.

Boric acid is particularly an offender in this respect, since it is hygroscopic. Potassium fluoborate is not and shows less tendency to soften upon exposure to average humid atmospheres or to absorb moisture.

The softening of the baked core is a physical characteristic which may be determined by subjecting the specimen cores to an atmosphere saturated with moisture vapor. Fig. 11 shows the amount of reduction of core strength that is possible due to a humid atmosphere.

The test is a drastic one, since cores are stored in a box into which some water has been placed. It is assumed that a relative humidity of ap-

proximately 100 per cent is thereby obtained. Any core will lose strength in such a test, but comparisons are possible by studying the respective slopes of the curves plotted from strength data.

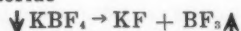
The potassium fluoborate is attacked in a lesser degree by atmospheric moisture. At the end of 16 hr. of exposure, the potassium fluoborate core still has approximately 50 lb. tensile strength, while the boric acid core is too weak to handle.

Fig. 12 shows how much moisture may be picked up by the cores under this exposure to high humidities. In the case of the boric acid, the sharp curve upward indicates that the absorption of moisture is rapid. At 16 hr., the amount of moisture absorbed from the air amounts to five times that of the potassium fluoborate core. This is substantiated by the tensile curve in Fig. 11, where it is seen that the boric acid curve falls rapidly during the short exposure times.

#### Thermal Reclamation Problems

Only a few foundries employ core sand reclamation methods, but these few foundries may find it difficult to reclaim sand containing potassium fluoborate by this method.

At the outset of this investigation of the use of potassium fluoborate, it was anticipated that the decomposition of potassium fluoborate to potassium fluoride



would entail little trouble in the calculating operation, provided efficient dust removal were possible. Such was not the case, however, since difficulty was encountered when potassium fluoborate core sand was calcined. At the calcining temperatures, the fluoborate melted and the sand was in a semi-plastic condition. The white silica sand was darkened, although it was thought that the calcination was as complete as possible.

Microscopic examination of the

sand grains indicated black deposits adhering to the roughened surfaces of the grains. Only a small portion of the silica grain was found to be coated with this black deposit, but it was sufficient to impart a grayish cast to the sand.

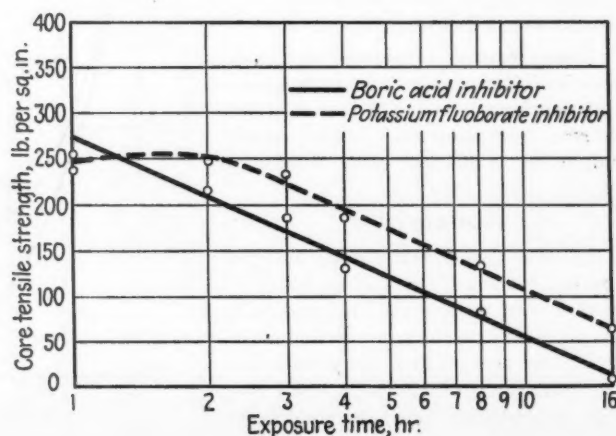
#### Conclusions

From the results obtained by laboratory and production tests described, the following conclusions may be drawn:

1. Potassium fluoborate will inhibit the oxidation of magnesium alloys
2. For heavy sections it may be necessary to use small quantities of sulphur for an extended protective atmosphere
3. Workability of core sands in the core making department is not impaired with the use of potassium fluoborate
4. Higher permissible baking temperatures result in hard-surfaced cores, making assembly easier and the insurance of cleaner molds
5. Uniform distribution and negligible loss of inhibitor during the baking eliminates the necessity of spraying and spray drying operations on the cores
6. Elevated temperature properties indicate that potassium fluoborate treated cores will be faster to collapse and easier to shake out than those in which boric acid is used
7. Core storage with potassium fluoborate will not necessitate special precautions to eliminate or minimize moisture pickup
8. Potassium fluoborate in cores makes the thermal reclamation of core sand difficult. A satisfactory process is still being sought.

It has been the purpose of this dis-

FIG. 11—Effect of humid atmosphere on core strength with potassium fluoborate and boric acid added as inhibitors.



cussion to present a new approach to the problem of inhibiting the oxidation of magnesium alloys. Since no two foundries practice the same technique, the efficacy of potassium fluoborate must be proved in each individual case. Whether this method will favorably compete with presently used inhibitors and techniques depends upon a survey of each foundryman's practice to determine whether the savings involved will warrant its use.

It is thought that by simplification of processes, greater economies will result and much of the degree of specialization can be eliminated to the

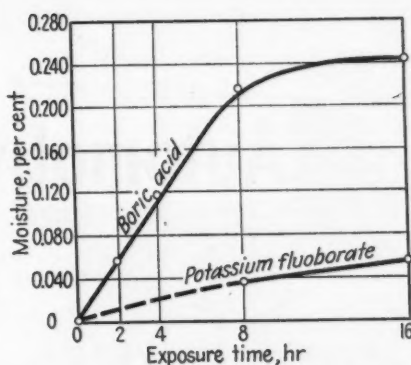


FIG. 12—Effect of exposure to humid atmosphere on moisture absorption of cores containing boric acid and potassium fluoborate as inhibitors.

advantage of the magnesium founder.

The author wishes to acknowledge the assistance given by General Chemical Co. in some of the analytical work on fluoborates.

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<sup>2</sup> Blohm, Oscar, "Magnesium Alloy Foundry Sand Control," *THE IRON AGE*, May 11, 1944, pp. 74-79.

<sup>3</sup> Chamberlain, M. V., and Peters, A. T., "Temperatures Developed in Sand Cores During the Casting of Magnesium Alloys," *Transactions, American Foundryman's Association*, Vol. 51, No. 1, pp. 155-179 (1943).

## Sharpening Router Bits Faster

ONE and two flute router bits are being ground in from one-half to one-third the time previously required at the Glenn L. Martin Co., Baltimore, with the aid of a specially formed grinding wheel devised by Raymond A. Marvel in the Army division tool crib. Grinding both the primary and secondary clearance in one operation speeds up the grinding operation and there is less tendency for metal to cake up on the router due to an absence of abrupt edges with the result that bits so ground last longer between grinds and break less frequently.

The grinding wheel was made from a worn out 6 in. grinding wheel and a 1 in., 30 deg. bevel was dressed off from the front side of the wheel. Leaving the top 1/64 in. of the bevel

**B**EVELING the side of a standard grinding wheel enables primary and secondary clearances to be ground on router bits in the same setup, using the rest shown.



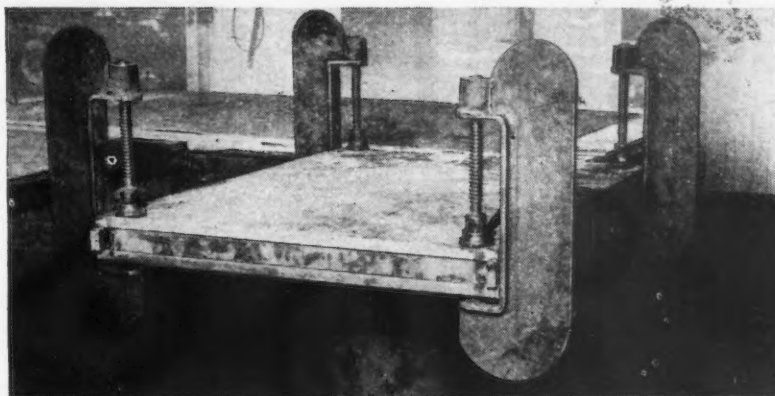
flat nearest the work to be done, a contour was then dressed into the remainder of the beveled surface.

In use a finger attachment is placed against the 1/64 in. flat surface to positively set the clearance desired. The work is then passed over the finger once with the flat surface cutting the primary clearance, and the contoured surface leaving the second-

ary clearance smooth and symmetrical. The secondary clearance can be controlled by the degree to which the contour is dressed.

Prior to the development of the new wheel, it was necessary to grind the primary and secondary clearances in separate operations, with an output of 110 bits per 9 hr. day as against up to 300 with the present method.

**I**N preparing stainless clad assemblies for peripheral welding, special rugged C-clamps are required with openings to accommodate assemblies of various thickness and strength to assure tabletop flatness. Composite Steels, Inc., a subsidiary of Jessop Steel Co., Washington, Pa., had a special rugged C-clamp made with square-cut threads instead of the conventional V-type threads. The screw, developed for this purpose by Duff-Norton Mfg. Co., permits the application of more pressure and results in longer service life for the C-clamp, as well as a tighter fit of the plates along the welds.



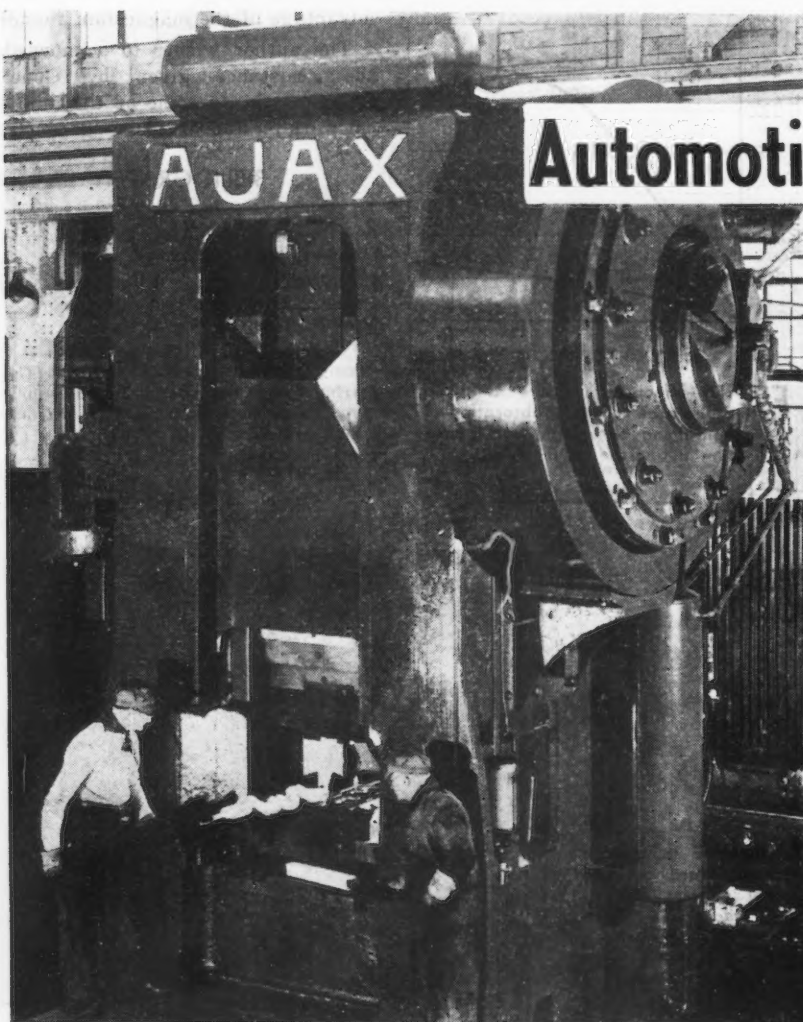


FIG. 1—Ajax press of 2500 ton capacity used for forging automotive crankshafts. Drive to the main shaft of the press is through the very large multiple disk clutch at the right of the press. Worker is removing a crankshaft after three blows on the billet.

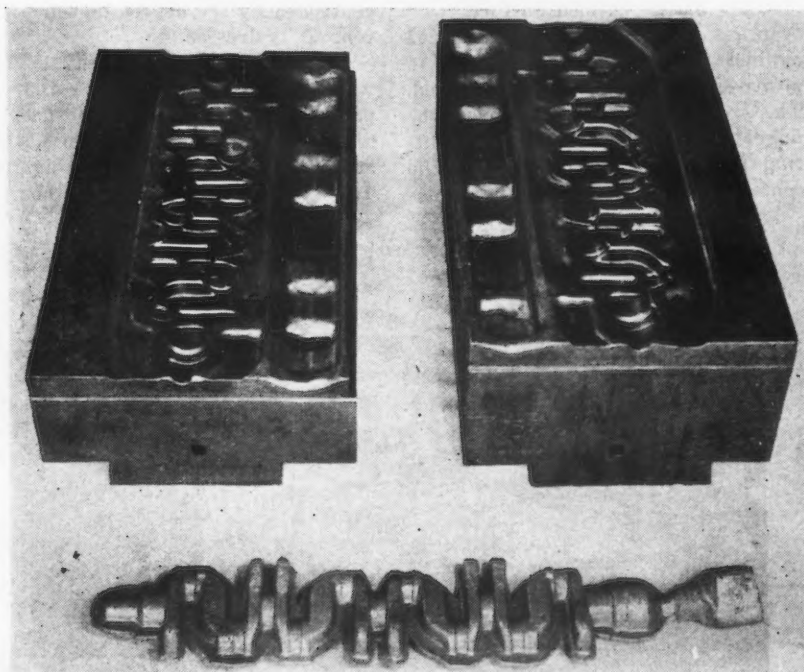


FIG. 2—An eight-throw crankshaft forging and the dies used to press form it.

## Automotive Crankshafts For

CRANKSHAFTS of a comparatively simple design have been press forged previously, but there was a question whether their quality measured up to the performance requirements of the automotive industry. An experimental project on the press forging of crankshafts with integral counterweights was begun by one important automotive forge plant in 1939, but was tentatively set aside in order to devote full manufacturing facilities to war production. Within recent months the developmental work was resumed. Press forging of the types of crankshafts illustrated in this article have been turned out with success at the Ajax Mfg. Co., Cleveland, on one of its heavy tonnage high speed mechanical forging presses.

Crankshafts, as they are now being forged in a steam hammer, require a skilled hammer operator, as manifested in that stage of the process when he needs to scrutinize the forging and decide whether to strike an additional blow or two. Only three blows were required to produce the crankshafts illustrated here as against 12 to 15 blows ordinarily served in the hammer to produce the same piece. Furthermore, no skill is involved in manipulating for light or heavy blows, as the press stroke is constant.

Since the crankshaft is the heaviest and probably the most vital forging in the present day automobile, it was decided at the outset of the press forging trials to adhere closely to the forging practices which had given satisfactory results on heavy steam hammers. The object was not so much an improvement in the physical quality of the forging, as it was to produce equally good physicals with, perhaps, close dimensional accuracy at a substantial reduction in forging costs. That this aim could be achieved seemed highly probable in view of results obtained on numerous smaller automobile forgings which had already been transferred from hammers to forging presses now operating in a goodly number of automobile forge shops.

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# Forged on Mechanical Presses . . .

the 12,000 and 16,000 lb. steam hammers in automotive forge plants were adapted to the die space of a 25-C Ajax high speed forging press by means of suitable shoes or bolsters. The press used was of the type built in a range of sizes by the Ajax Mfg. Co. for impression die forging production, and is illustrated in Fig. 1. Designated as a 25-C size and rated at 2500 tons capacity, it was known to be somewhat light for this work but it happened to be the largest press available at the time. The press has a stroke of 14 in., with a rate of 50 strokes per min. The eccentric main shaft is 18 in. diameter in the main bearings. The frame is a single steel casting; the slide with rear extension guide bearing has extra guided length for accurate alignment and is pneumatically counterbalanced to prevent dropping ahead on the down stroke before the work is encountered.

## Special Clutch

Drive to the main shaft is through an extra large multiple-disk air-operated clutch mounted on one end of the main shaft, with band brake on the other end of the shaft. A 175 hp. motor through V belts, turns the heavy flywheel equipped with friction slip hub mounting for safety. This latter feature proved its value in over-capacity testing when the balance between flywheel energy friction slip torque, and motor overload throw-out left the dies open on the numerous stalls that were encountered during the development, and saved much time and labor in backing off.

An eight-throw crankshaft forging is shown in Fig. 2, along with the dies used during the development. It may be noted that the dies in this instance have only fullering and finish forging impressions. Billet stock of the same size as for the hammer forging was used, but during the early trials the length was cut down to one-half or two-thirds so that results could be obtained without seriously overloading the press.

In the fullering or rolling impression, it was surprising how closely the two full blows of the press ap-

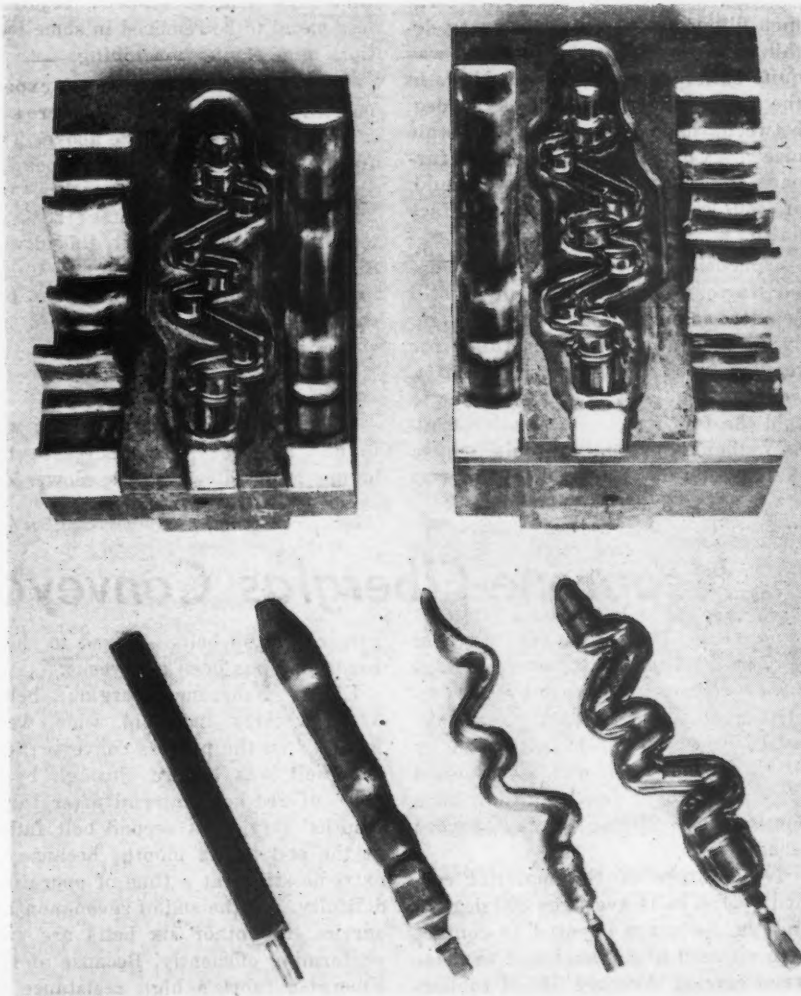
**. . . Experimental runs indicate that production is considerably higher than on the steam hammer due to the fewer number of blows required to produce a forging of satisfactory finish, while the greater simplicity of operation demands less effort and skill.**

proximated the results of the numerous light blows struck by the hammer. The only change necessary was to increase the volume of the impressions by a slight amount so as to accommodate the stock when the dies were tight together, whereas, in the hammer with its lighter blows they were slightly apart.

In the finishing impressions, par-

ticularly in the counterweight locations, the forgings at first failed to fill out, although the amount of adjacent flash indicated that the stock distribution was correct. A die lubricant did not provide a remedy, but in effect exaggerated this condition, thus indicating that the impressions were "air-locked." Liberal vent holes were then drilled in those locations last to

**FIG. 3—Showing the preforming that is done on a lighter crankshaft before the final finishing impression at lower right.**



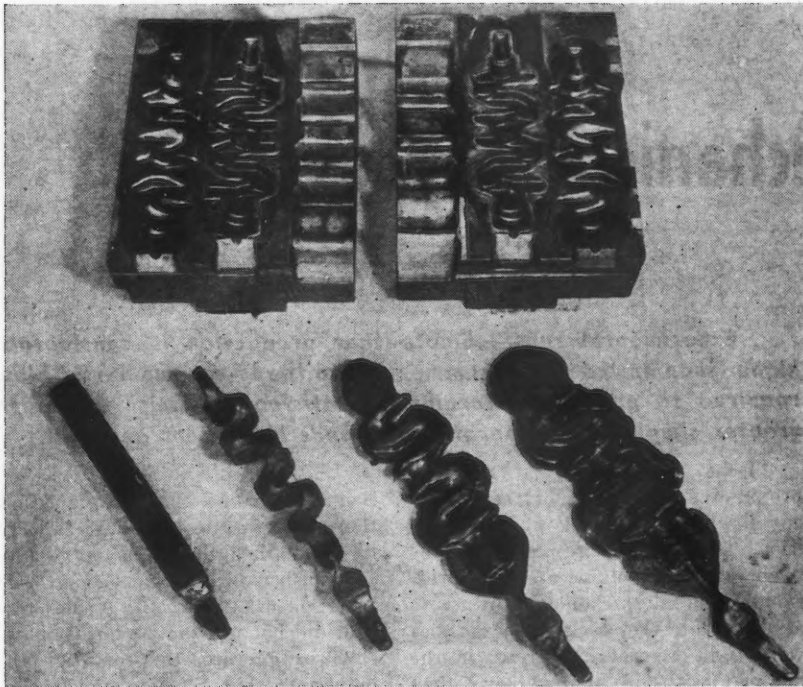


FIG. 4—Shaft with thin counterweight made in dies having only bending, roughing and finishing impressions, but no fuller impression.

fill, and resulted in crankshaft forgings filling out perfectly in every detail. The finish on the forgings was quite satisfactory as the two blows in the fuller, turning the stock 90 deg. between, had disposed of the scale nicely. Controlled atmosphere furnaces or hydraulic descalers would, of course, further enhance surface finish.

Dimensionally, the forgings were satisfactory, but the use of a still heavier capacity and a more rigid press, such as would be installed for regular production on crankshafts, would undoubtedly make it possible to hold the forgings to closer tolerances. A further improvement would involve the installation of suitable ejectors so

that draft can be reduced, requiring less metal to be removed in some locations and saving machining.

Other crankshafts were experimented with and the results were substantially the same as the above. Two four-cylinder, three main bearing shafts without counterweights, one 24½ in. long and the other 28½ in. long, were made without difficulty in dies having fuller, bender and finishing impressions. The operations and the dies for the lighter shaft are shown in Fig. 3.

#### Bender Dies

Where a bender was used, it was found necessary to increase the humps and valleys, as the slower die

speed of the press did not shoot the stock as far into the bends as the higher velocity hammer blows. Slight modifications on the bender dies, did bring the stock into the right position to fill the finishing impressions.

On the four-cylinder, three-bearing shaft with thin counterweights (Fig. 4), considerable difficulty was experienced in filling the counterweights with the same sized stock as was used on the hammer. These dies had only bending, roughing and finishing impressions, no fuller being provided. While venting both the rougher and finisher impressions was a great help, provision of a fullering impression to give a better proportioned stock distribution and more uniform flash would be the best solution.

A heavy six-throw, four-bearing crank with counterweights was also forged in position without difficulty using interlocking dies. This shaft was forged from both billet and pre-rolled stock, the only difference being the lesser weight of the latter blank.

Considerable economy can be expected through use of the high speed forging press for crankshaft forging. Production will run considerably higher due to the smaller number of blows required to produce a given forging. Although the cost of the press is considerably greater than that of the hammer, only an electric motor is required to drive the press, whereas a heavy investment in steam plant or air compressors is necessary for hammer operation. There is also a saving in the foundation for the press, as the forging pressures developed in the press are self sustained within the bed frame. The absence of impact in the operation of these forging presses eliminates much of the maintenance expense inherent in hammer operation, as there is no ground vibration imparted to nearby precision machinery or other equipment.

## Neoprene-Fiberglas Conveyor Belts Tested

LONGER life for fabric conveyor belts subjected to severe operating conditions is forecast by the performance of experimental Neoprene-coated Fiberglas fabric belts made by B. F. Goodrich Co. and tested on a process conveyor line operating on a continuous 24-hr., 7-days-a-week schedule.

Temperature of the material carried by the belts averages 300 deg. F. and the belts are exposed to contact with oil used in the binder of the material carried. Average life of rubber-

covered cotton belts exposed to these conditions has been six weeks.

Eight Neoprene-Fiberglas belts, 3/16 in. thick and 4 in. wide, were installed on the process conveyor line. One belt was burned through by a piece of red-hot material after three months' service. A second belt failed at the end of six months because of extreme stress at a time of operating difficulty. At the end of seven months' service, the other six belts are still performing efficiently. Because of the Fiberglas fabric's high resistance to

elongation, adjustments to keep the belts in even tension have been practically nil.

In fabricating the Neoprene-Fiberglas belts two inner plies and two outer plies of Fiberglas cloth, 36 in. wide, were given a thin coat of Neoprene and then calendered to obtain the required thickness of coating. The coated, uncured plies were assembled and the Neoprene cover applied. The entire assembly was then press cured and cut to required lengths and widths.



# Temperature of Molten Steel

## Measured With Immersion Thermocouple

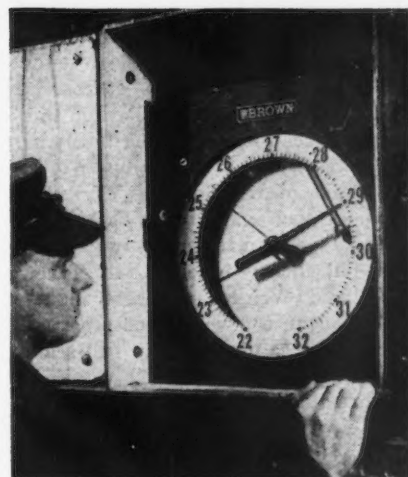
ment in the melt shop in February, 1944. The pyrometer consists of two interchangeable parts, an immersion head (a platinum and platinum-rhodium thermocouple encased in a fused silica tube mounted in a block of graphite) and a handle which is a 12 ft. insulated pipe containing the wires leading to an electronic recorder.

The operator of the Rustless device simply manipulates the immersion head through the door of the electric furnace and dips it into the steel bath. The exposed tip of the silica tube, which contains the platinum thermo-

rienced eye of the melter, judging the appearance of a small sample of the molten metal withdrawn from the melting furnace.

The Rustless thermocouple, making possible the accurate measurement of steel temperature, today provides the steel melter with the means of accurate control of one of the most important variables in the manufacture of steel. The practicability of the device, working as it does at temperature so high that most materials are either softened or completely destroyed, lies in the speed with which the equipment measures and records the molten steel temperature. The electronic instrument responds so quickly to the temperature of the thermocouple that it is possible to immerse the unit into the molten steel at temperatures as great as 3200 deg. F., obtain a reading and remove the equipment from the melting furnace before the device is destroyed or melted by the intense heat. The whole operation takes about 45 sec.

Although expensive platinum wire is used, it has been found that an individual reading costs little more than \$1. The design of the equipment and its operation is such that the platinum wire and the other materials used in its construction are not destroyed.



**W**ORKER checks electronic recording device which keeps a permanent record of "heat" temperatures ranging from 2200 to 3300 deg. F. The sweep hand on the dial makes it easy to check the temperature of the heat.

couple wires in a graphite block, is immersed in the bath in contact with the metal, the slag layer and the hot atmosphere of the furnace.

The instrument by which the measured temperature is recorded is equipped with a large pointer and dial calibrated in degrees Fahrenheit. This recorder is mounted conveniently near the furnace where it is easily visible to the melter and to the man operating the thermocouple. Hitherto, the measurement of the temperature of molten steel has depended almost entirely upon the expe-



**P**LATINUM thermocouple for recording accurate temperatures of molten metals up to 3300 deg. F. developed by L. F. Weitzenkorn (right) and G. C. Klingel (left), metallurgical engineers at Rustless Iron and Steel Corp.



**O**PERATOR of thermocouple pyrometer inserting the immersion head into an electric arc furnace at the Rustless Iron and Steel plant in Baltimore. The head is immersed in the molten stainless steel for 45 sec. accurately recording the temperature.

**B**Y adapting and improving upon a British device, metallurgical engineers at Rustless Iron and Steel Corp., Baltimore, have devised a platinum thermocouple pyrometer which measures the temperature of a stainless steel bath before the heat is tapped from an electric arc melting furnace, the reading being recorded by an electronic instrument. The development makes possible improvement in the quality and uniformity of the company's stainless steels.

The new pyrometer goes a step beyond its predecessor, the optical pyrometer, which was limited to the measurement of temperature when the liquid steel was visible in the open and being poured. The Rustless device measures the temperature of the heat of steel in the melting furnace—even though the steel is covered with a layer of slag—at a time when steps can be taken to regulate and control the temperature. After the steel is tapped from the melting furnace, little or no temperature control is possible.

Rustless began its experiments with thermocouple pyrometers in 1939 and installed the perfected instru-



# Aluminum Fins Rolled On Aircraft Engine Cylinders

**... An annual saving of 12,000 tons of nitralloy steel is being achieved by the substitution of aluminum strip rolled on edge and caulked in grooves in the steel barrel of aircraft engine cylinders. Use of deeper fins and 30 per cent more of them results in much more effective cooling of the barrel. How this new type of "W" fin is applied to Wright Cyclone aircraft engine cylinders is described in the accompanying article.**

**D**ISSIPATION of heat from air-cooled aircraft engine cylinders has been a subject for research over a considerable number of years by the engineers of the Wright Aeronautical Corp., no less than by those of other manufacturers. The constant demands for increased power, and consequent greater heat dissipation, have been met successfully in the past by the comparatively simple expedient of increasing the number and depth of the cooling fins, but as power moved into the still higher range it became apparent that manufacturing difficulties would soon intervene to prevent rapid and efficient production.

The cylinder barrel in particular offered a difficult problem, and various methods of improving its cooling characteristics were tried and rejected on the grounds of either exces-

sive weight, inadequate heat dissipation or manufacturing difficulties. A sheet aluminum fin seemed to offer the best possibilities but no successful production method of anchoring this to the barrel was discovered until the "W" form was invented by W. B. Bronander of the Scandia Mfg. Co., North Arlington, N. J. This form offered a solution to the many production difficulties inherent in other types, and Wright engineers immediately began a development program with a view to placing it in full scale production.

Fabricated from aluminum strip, this new fin is caulked into shallow grooves cut into the steel barrel, Fig. 1, and many months of experimental testing, as well as of actual service experience in combat areas, have shown that its heat dissipating qualities are substantially higher than

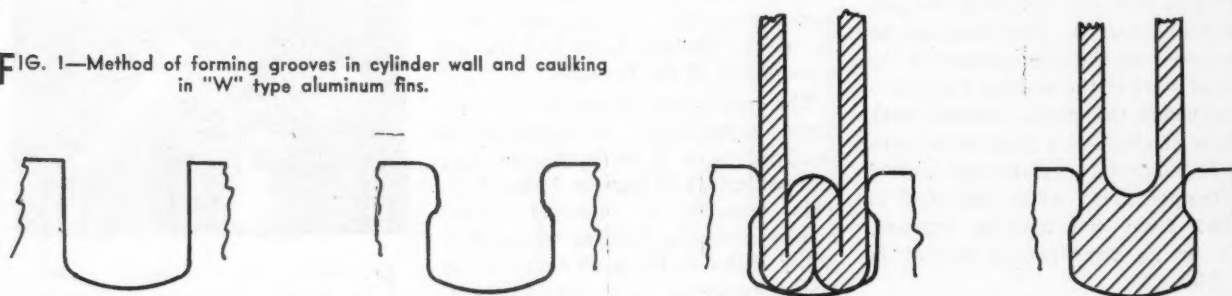
those of the original steel fin or of any of the other types of applied aluminum fins tested.

The fin itself is made from 0.025 in. thick dead soft aluminum strip (AMS 4001) containing only 1 per cent of impurities, and thus possesses excellent corrosion resistant and heat conducting properties. It is produced by the Scandia company by progressively rolling the aluminum strip into the form of an exaggerated letter "W," with the two outside legs 1 in. or more in height, and the center portion only  $\frac{1}{8}$  in. high. As the formed strip leaves the rolling machine it is automatically coiled onto a drum having the same diameter as the root of the cylinder barrel grooves. When the drum is full the coil is removed and placed in a special Scandia machine which automatically cuts it into accurate half circles and stacks these on a carrier for inspection.

## Saving in Steel Effected

Prior to the development of this new design, fins were machined from the solid steel forging of the barrel, and although this was done on Fay automatic lathes, using gang tool setups, the operation of cutting 46 fins only 0.025 in. thick and  $\frac{5}{8}$  in. deep

**FIG. 1—Method of forming grooves in cylinder wall and caulk-  
ing in "W" type aluminum fins.**



Groove as machined in  
Cylinder Barrel

Form of groove after  
rolling the lands

"W" Fin inserted in  
groove

"W" Fin caulked into  
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required considerable time and the removal of some 17 lb. of metal in the form of chips. The rough forging in this case had a wall thickness of 1 in., whereas for the new barrel only  $\frac{1}{2}$  in. is required, and an annual saving of some 24,000,000 lb. of highly critical nitralloy steel is thus effected. Coming at a time when the steel situation was extremely tight, this new development made it possible to greatly increase the production of Cyclone engines without dipping further into the national steel stockpile, while at the same time manufacturing an improved product.

It would have been possible to increase the depth of the steel fins, but this would have necessitated a substantially heavier forging, and would also have resulted in a heavier finished part. Furthermore, there is a definite limit beyond which it is not practical to attempt to machine such

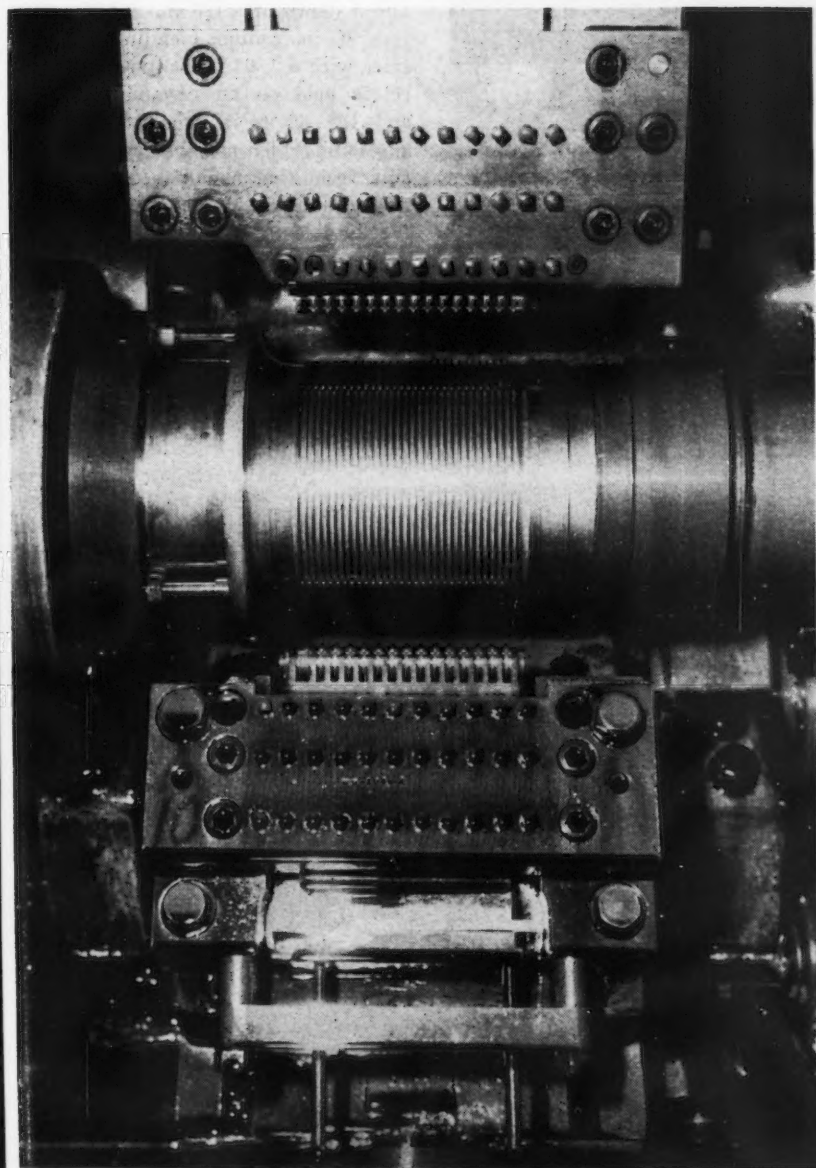
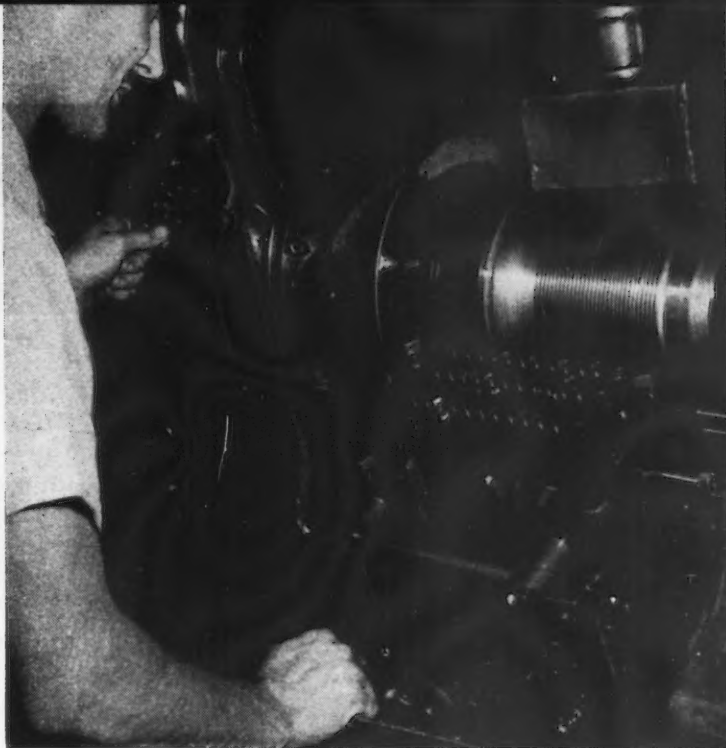
RIGHT

**FIG. 2 —** Machining  $\frac{1}{8}$  in. deep grooves in Cyclone cylinder barrels using the same equipment as was formerly employed for cutting the  $\frac{3}{8}$  in. deep fins.

o o o

BELOW

**FIG. 3—**A closeup of the rolling tools on the Fay automatic lathe.



slender fins, whereas, with the new fin there are no machining difficulties to be considered, and valuable experience is being gained against the time when it may be desirable to have fins as deep as even 2 in.

Although aluminum is lighter than steel, the increased depth of fin and the comparatively thick inter-fin lands tend to offset this to some extent; nevertheless, the complete barrel weighs 1 lb. less than the steel fin barrel, a saving amounting to 72 lb. on a four-engine Superfortress.

### Better Cooling

Aluminum fins in use at the present time on one particular model of engine have a height of 1 in., and this, coupled with the fact that 60 fins are installed in the space formerly occupied by 46, results in an increase of cooling area of more than 55 per cent, and in consequence cylinder barrel temperatures under normal operating conditions are running from 60 to 100 deg. lower than with the steel fin. Due to the method of construction, the W fin has 50 per cent more contact area with the steel barrel than is possible with the sleeve or muff type, and so tightly is it caulked into place that there is no appreciable loss of conductivity due to the presence of air pockets. Should future developments make it necessary, the depth of the fins may be increased to a degree limited only by the spacing between the cylinders.

From the service point of view, the aluminum fin offers a decided advantage in that, if damaged either by



FIG. 4—The new "W" fins for Wright Cyclone cylinders are loaded into blocks for assembly to the cylinder barrel.

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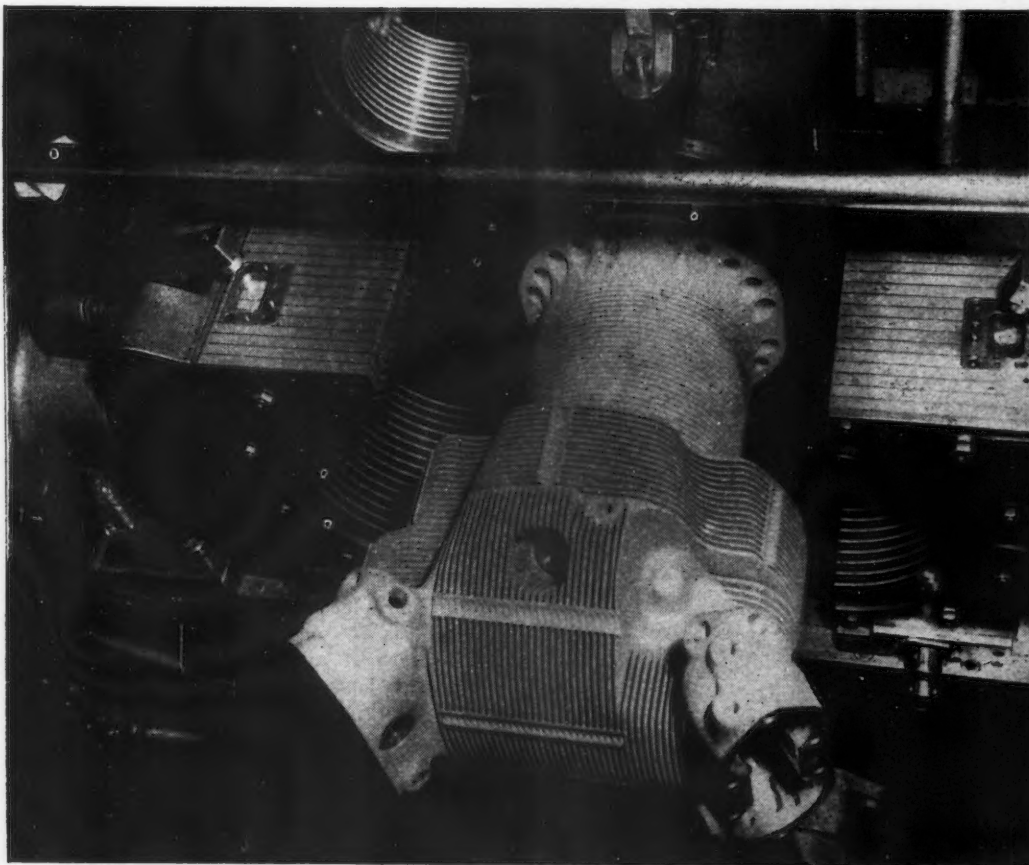


FIG. 5—A closeup of the dual press used for inserting and staking the fins on a Cyclone cylinder barrel.

o o o

careless handling or by a crash it may be straightened by hand without danger of cracking, a feature not possible with either steel fins or cast aluminum muffs. In the case of fins cut away by enemy fire these may be removed individually and replaced. Test cylinders have been heated to 500 deg. F. and cooled to 50 deg. below zero, and it has required a straight pull of between 700 and 800 lb. to remove the fins. To remove them for replacement purposes a cut is made through the root of the fin which can then be lifted out without difficulty.

With the exception of the fin cutting operation, the manufacture of the new cylinder barrel is exactly the same as the old one, and it has thus been possible to make use of all existing equipment. The Fay automatic lathes formerly used to cut the 46 deep fins in the steel are now employed to cut the 30 grooves, Fig. 2. These have a width of 0.116/0.119 in. and a depth of 0.125 in. At the root is a  $\frac{1}{8}$  in. radius, blending into the sides with a  $\frac{1}{64}$  in. radius. The barrel is held on an expanding arbor, and the 30 tools are fitted into a magazine which may be removed as a unit from the machine for grinding and adjusting. Machining time is reduced to less than one-third of that

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**FIG. 6**—Simple but highly effective, this Scandia machine rolls down the center section of the "W" fins to caulk them securely into place.



formerly required, thus leaving plenty of machines available for the second operation, which consists of rolling the lands by means of formed rollers similarly held in a magazine. These roll down the tops of the lands, Fig. 3, thus producing a dovetail in the grooves, and at the same time form a radius on the edge to prevent cutting of the aluminum when the fin is inserted.

#### Assembly of Fins

After the cylinder head has been screwed and shrunk on to the barrel the fins are assembled on a special machine designed by Wright engineers, Fig. 4. The individual fins are inserted into two magazine blocks by four girls working on opposite sides of a bench at the end of which the machine is located. The spacing is controlled by means of narrow steel blades fitting between the legs of the W, each of which carries three small projections to serve as staking punches. The first pair of blocks takes fins numbers 1, 3, 5, etc., while a second pair takes numbers 2, 4, 6, etc., and one set is loaded while the other is in use. The top 23 fins are of equal height, but the remaining seven are only  $\frac{3}{4}$  in. high.

A pair of loaded blocks is inserted into special holders connected to the pistons of two diametrically opposed hydraulic cylinders, and the barrel is placed over an expanding arbor, locating on one of the flange holes. When the foot pedal is tripped the arbor expands to hold the work, and the two blocks move inward, pressing the fins into grooves and staking them at three points, Fig. 5. The blocks are then withdrawn and replaced by the second set, and the cylinder is indexed 90 deg. A cam on the index plate moves the cylinder outwards an amount equal to the spacing between the fins, thus bringing the empty grooves in line with the new set of fins.

A special Scandia machine is now employed to caulk the fins firmly into



**FIG. 7**—An engine lathe trims the fins to final size and shape. Note the unusual size of the forming tool used.

place, Fig. 6. The assembly is placed on a rotating arbor, and a set of spacers is engaged in the spaces between the fins. These serve to straighten out any fins that may be slightly distorted, and prevent the caulking blades from catching on the edges. The caulking is performed by a series of narrow steel blades which are fed one by one into the W's. These 30 blades are held in a magazine, at the front of which is a guide to assure proper spacing. To engage a blade, the operator slides a small steel block,

removed to the feed side of the machine, and the empty feed magazine becomes the new receiver.

The assemblies are now taken to a Lehmann Hydrotrol lathe equipped with a form tool which has a width equal to the length of the finned portion of the barrel, and a cut is taken across the entire outside diameter of the fins, Fig. 7. From the top 20 fins approximately 1/16 in. is removed, but from this point the depth of cut increases progressively until the height of the bottom fin is only 3/8 in.



FIG. 8—In the final operation, "W" fins are crimped in a hydraulic press to stiffen them and hold equal spacing.

held in his hand, along the face until a spring latch engages a hole in the blade. He then pushes the blade through the guide until it is engaged by a grooved steel pressure roller located directly below the cylinder. The rotation of the cylinder then feeds the blade out of the magazine and discharges it into a receiving magazine at the opposite side. This action caulks down the central portion of the W into virtually a solid mass, completely filling the groove in the barrel and locking the fin securely into place. When the operation is completed, the full receiving magazine is

This taper is necessary to provide clearance for the hold down screws by which the cylinders are attached to the crankcase at final assembly, and although it does reduce the amount of cooling area, this is not important near the base of the cylinder since there is considerably less heat to be dissipated at this area. The tool is carbide tipped and the operation is performed dry. A jet of compressed air is employed to blow the chips away from the cut to avoid marring the fins, and this serves also to cool the tool. In addition to removing surplus metal, this operation also

serves as a check on the tightness of the fins, since any fin not properly caulked will be pulled out by the action of the tool.

Burrs are removed on a speed lathe by means of a wire brush and abrasive cloth, after which the assemblies are passed to a second caulking machine where each fin is re-caulked as an additional safety precaution.

The final operation consists of crimping the fins for stiffening purposes and to hold the spacing. The barrel is placed on an arbor on a small hydraulic press, Fig. 8, and located so that the split between one set of fins is uppermost. By means of a lever on each side of the machine a set of guides is inserted between each fin, and a third set brought down from the top. The pedal is then tripped and the ram descends. The top fin of each pair is crimped down for a distance of 1/4 in. until it touches the top of the second fin at a distance of 1/2 in. from the center line on each side. The lower fin of each pair is similarly crimped down to touch the top of the next lower fin at a distance of 1 in. on each side of the center. The cylinder is then indexed 90 deg. and the operation repeated until four sets of crimps have been made. The bottom six fins are not crimped since, being lower in height than the others, they have sufficient inherent rigidity.

Painting or metallizing is not required with this new cylinder since the fins themselves, being of virtually pure aluminum, are corrosion resistant, and the cylinder barrel is cadmium plated prior to the insertion of the fins.

Among the engines employing this new type of fin may be mentioned the 2200 hp. Cyclone 18 installed in all the Boeing Superfortresses. The record of their successful actions against the arsenals of Japan is convincing proof of their reliability.

## Rubber Cement for Metals

A NEW rubber cement, named Plastilock 500, a non-thermoplastic, water and aromatic oil-resistant adhesive for bonding metals, wood, plastics and ceramic material to themselves or to each other is announced by the B. F. Goodrich Co., Akron, Ohio. The company claims it provides superior bonding qualities and in some cases can be used in place of rivets or screws.

Used for metal-to-metal bonding, the new adhesive has shown a shear strength of 3250 lb. per sq. in. Tension strength of 4000 lb. have been reached.

# Dielectric Heating Applied To Thermosetting Plastics

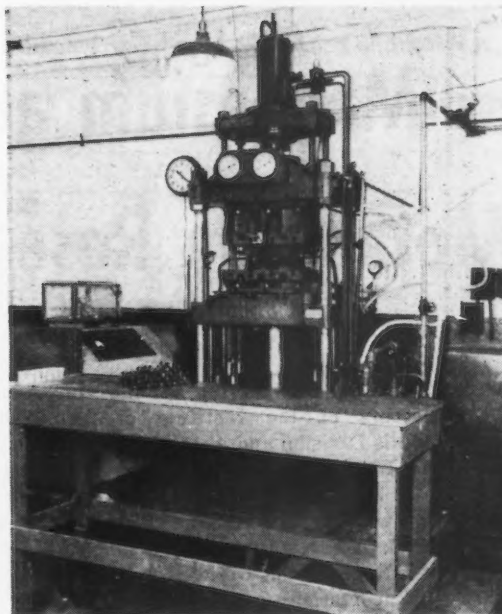
EXPERIMENTS made at the Bryant Electric Co. plant in Bridgeport indicate that by the electronic heating of preforms, thermosetting plastic materials like phenol, urea and melamines may be molded on a competitive basis with injection molded acetates. The first electronic heating unit and forming press set up there to operate manually have proved successful in the manufacture of small electrical insulator parts, like outlet plugs. Curing time has been reduced from minutes, required in ordinary compression molding practice, to seconds. As a result, using a much smaller press, it was possible to turn out 20 per cent more pieces from an experimental six-cavity mold as were previously turned out from a 24-cavity compression mold.

In ordinary practice, a preform made of a wad of the plastic material is placed into a hot mold, is heated, then subjected to high pressure and temperature for a curing period. In the setup at Bryant, the preform wafers were placed in a 2 kw. Westinghouse high frequency heater whether it was exposed to short wave electronic beams for a few seconds. The hot preforms were then transferred to a 75-ton Baldwin-Southwark press especially designed for this service. Under a pressure of 12,000 lb. per sq. in., it took only a matter of seconds to cure and shape the preform in the mold.

In these tests, it was found that because the heat is established inside the preforms as quickly as the outside, there is no opportunity for the outer portion to overcure before the inside gets hot. Because the preforms go into the mold hot, much lower pressures can be used. This means smaller presses. It is estimated that as a result of lowered pressure that for a particular job, the press would cost approximately one-third of a straight compression press; that maintenance costs will be reduced to a fifth and the molds will have 30 per cent longer life.

Bryant estimates that the mold savings in this one experiment be-

BALDWIN-SOUTHWARK 75 ton press used for transfer molding of thermosetting plastics preheated by Westinghouse high frequency unit shown at left. Considerable savings were shown by this experimental setup at Bryant Electric Co.



tween the six cavity and the 24 cavity molds at \$6,000, in addition to a 12½ per cent savings in plastic materials since the Baldwin press does a precise extrusion job and there is a decided saving in flash. Longer life of the molds results from reduction of pressures on the material molded. Besides, materials that can be hobbled more readily can be used for mold construction.

Participating in these experiments were engineers from Baldwin-Southwark division of Baldwin Locomotive Works, Westinghouse Electric & Mfg. Co., and Monsanto Chemical Co. Mon-

santo has been studying the use of different plastics in creating other postwar products of larger size and many different shapes.

The Baldwin-Southwark presses newly developed for this service will be available in capacities from 50 to 300 tons and can be operated either directly from an accumulation system or by means of self-contained motor-driven pump units. The 75-ton unit shown has a hydraulic plunger on top which is used for pressing the preheated material into the mold. In straight compression molding, this cylinder is not operated.

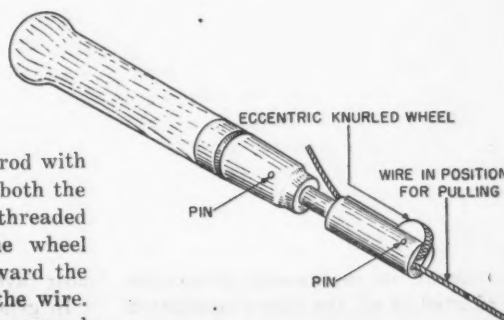
## Slip-Proof Wire Puller

AN easily constructed wire puller, devised by Carl Schreck of General Electric's Schenectady Works regulator division, has improved the method of tightening locking wires. The puller is easier to handle and much safer than the conventional method, tightening wire with pliers, especially for women who are now doing the job.

A knurled, eccentric wheel ½ in. thick ½ in. in diameter is the main element of the new device. It is mounted in a piece of drill rod with a milled slot to accommodate both the wire and wheel. The wire is threaded into the slot and under the wheel which is then rolled back toward the handle to apply pressure on the wire. The grip is automatically increased

as the operator pulls the tool to tighten the wire.

The ½-in. drill rod is approximately 2½ in. long and the shank end is turned to a ¼-in. diameter and is fitted and pinned in a wooden handle. The pin, knurled wheel, and rod are all hardened.





# Magnesium and Powder Metallurgy Research Reported

**C**ANCELLATION of the annual meeting of the Institute of Metals Division and of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, which had been scheduled for the week of Feb. 19 in compliance with the rulings of the Office of Defense Transportation, prevented the personal presentation of 56 technical papers. Although all of these papers will appear in the publications of the AIME, a delay of some months will be involved. Since many of these reports contain new information, THE IRON AGE has abstracted a number, and herein presents summaries of the investigations of the effects of heat treating of magnesium casting alloys and of the pressing of powder metallurgy compacts. In a subsequent issue, the results of investigations of hardenability of steels and of the extrusion process will be reported.

New officials of the two Institute divisions who ordinarily would take office at the close of the convention follow: Chairman of the Institute of Metals Division for the coming year will be E. E. Schumacher, chief metallurgist, Bell Telephone Research Laboratories, Murray Hill, N. J.; L. W. Kempf, metallurgist, Aluminum Co.

of America, Cleveland and E. A. Anderson, New Jersey Zinc Co., Palmerton, N. J., will act as senior vice-chairman and vice-chairman respectively; Frank T. Sisco has been reelected secretary of the Metals Division. Serving on the executive committee for a three-year term are Walter Bonsack, National Smelting Co., Cleveland; Walter A. Dean, Aluminum Co. of America, Cleveland; and Louis Jordan, executive secretary, War Metallurgy Committee, Washington.

The Iron and Steel Division has elected E. G. Hill, director of metallurgy and development, Wheeling Steel Corp., Wheeling, W. Va., as its 1945 chairman. New vice-presidents are W. E. Brewster, assistant general superintendent, Wisconsin Steel Works, Chicago; Gilbert Soler, Timken Roller Bearing Co., Canton, Ohio; and T. S. Washburn, assistant manager, metallurgy and inspection, Inland Steel Co., Chicago. Elected to the executive committee are Karl Fethers, metallurgist, Youngstown Sheet & Tube Co., Youngstown; J. S. Marsh, research engineer, Bethlehem Steel Co., Bethlehem; and C. E. Sims, Battelle Memorial Institute, Columbus.

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## Quenching of Magnesium Alloys to Secure High Yield and Good Ductility

**I**N their study of the "Water Quenching of Some Typical Magnesium Casting Alloys," R. S. Busk and R. E. Anderson, metallurgists, Dow Chemical Co., Midland, Mich., found that the rate of cooling of commercial magnesium-base casting alloys from the solution heat-treated state affected the properties obtained upon subsequent precipitation. Improvement in mechanical properties is effected in all the alloys considered by increasing the rate of cooling. The

improvement obtained was found greatest for C alloy (9 per cent Al, 2 per cent Zn and 0.2 per cent Mn) and least for R alloy (9 per cent Al, 0.7 per cent Zn and 0.2 per cent Mn). The tensile properties of metal in complicated production castings are improved by quenching the castings before aging, at least 10 per cent, and even considerably more under the most favorable conditions.

In general, the rate of cooling produced by hot water quenching C alloy

is beneficial to the properties not only of separately cast sound test bars but also of the casting sections themselves. The most noteworthy improvement is in the combination of high yield strength with good ductility. This is especially evident with low temperature short time aging following the solution heat treating and quenching.

The improvements in physical properties are all gained without introducing significant locked-up stresses in the casting. Thus full design benefit can be taken from the increased property values. Since the endurance limit is not greatly raised by quenching and aging, this process is of practical importance in those cases where high strength is important, and where better fatigue properties at low cycles are necessary.

When a complicated casting is suddenly chilled, different cooling rates are produced in the various sections. This gives rise to stresses, due to differential contraction, which may result in residual stresses, warping or cracks. Qualitative observations during the sawing of quenched castings have indicated the presence of only low residual stresses. Extensive relaxation studies show that there is rapid relief of stress during precipitation treatments. Thus, in the case of heat treated C alloy, 50 per cent of the stress is relieved in 1.5 hr. at 330 deg. F., while all the stress is relieved in 10 hr. at 350 deg. F. Heat treated H alloy, 6 per cent Al, 3 per cent Zn and 0.2 per cent Mn, requires somewhat longer at 350 deg. F., but in 2.5 hr. 50 per cent of the stress is relieved while in 24 hr. all stress is relieved. At 500 deg. F. either alloy is completely stress relieved in 1 hr. These figures are independent of the absolute magnitude of the stress. Therefore, the authors feel safe to state that heat treated, quenched and aged magnesium castings will have very small if any residual stresses.

From Table I on the following page showing the effect of cooling rates on

the tensile properties, it can be seen that considerable improvement is effected with C alloy, some with H and R alloys. There is a direct relation between the rate of cooling and the improvement of mechanical properties.

Since ideal castings are seldom completely attained, tests were made to discover the effects of each defect on the quenched and aged properties. Some special test bars were made in such a manner as to produce porosity in the reduced section. These were heat treated, water quenched and aged, then radiographed and the porosity rated. Although results were quite erratic, the strength of the quenched bar was always higher than an air cooled bar with a similar amount of porosity. With considerable porosity present, the tensile strength of the quenched and aged C alloy was 10 per cent better than that of the air cooled and aged bar.

The fatigue strength of porous C

TABLE I  
Effect of Cooling Rates on Tensile Properties of Aged C, H and R Alloys

Cooling Time From 770 Deg. to 370 Deg. F., Sec.	C			H			R		
	E, %	Y.S.*	T.S.*	E, %	Y.S.*	T.S.*	E, %	Y.S.*	T.S.*
190.0	2.0	24.1	40.0	5.0	19.2	40.0	2.5	22.9	40.0
65.0	1.8	25.0	41.9	3.4	23.4	40.4	2.0	23.6	40.2
5.5	2.2	30.0	45.9	5.7	21.7	42.4	2.6	23.1	40.6
0.5	3.5	29.9	48.2	7.3	21.6	45.1	3.3	24.6	44.4

\* 1000 lb. per sq. in.

alloy after quenching and aging was compared to air cooling and aging. If any porosity visible in a radiograph of the specimen were present, no improvement due to quenching was detectable. Thus improvement in the fatigue strength can be effected by quenching only when the material is sound and even then the improvement is small.

be secured, it was pointed out, in electrolytic magnesium alloys by either superheating or stirring under conditions where there is no reason to suspect the presence of carbon.

In summarizing their results, the authors found that the carbothermic ASTM No. 17 magnesium alloy experiences full grain refinement at temperatures as low as 1400 deg. F. which is considerably lower than the temperatures reported to be necessary for alloys prepared from electrolytic magnesium. When held at 1300 deg. F. or 1350 deg. F., the unsuperheated alloy experiences incomplete grain refinement while superheated alloy coarsens to some extent.

The grain size obtained is virtually independent of the superheat temperature provided sufficient time of superheating is allowed. The time required for full grain refinement of the alloy is 1 hr. at 1400 deg. F. and much less at higher temperatures. (See Fig. 1.)

In making their studies, the authors used the following procedure. A 5-lb. section of a 20-lb. magnesium alloy ingot was melted in a Tercod crucible in a gas-fired furnace and fluxed thoroughly with about 2/3 lb.

## Grain Refinement of Carbothermic No. 17 Magnesium Alloy by Superheating

RALPH HULTGREN, David W. Mitchell and Bernard York of the University of California, working for the War Metallurgy Committee, prepared a paper on the "Grain Refinement of a Carbothermic Magnesium Alloy by Superheating." The carbothermic ASTM No. 17 alloy was of the following composition: 8.62 Al, 2.07 Zn, 0.49 Mn, 0.2 max. Si, 0.04 max. Cu, 0.005 max. Ni, 0.2 max. other impurities, and the remainder Mg. It was found to experience grain refinement at temperatures considerably lower than those reported for magnesium alloys of electrolytic origin. This indicates, the authors reported, that the alloy contains some constituent not present in electrolytic metal. Since the grain size of electrolytic metal may be refined at equally low temperatures if carboniferous gases are bubbled through it,\* formation of a carbide may be responsible for this action. A carbide is also a likely constituent of carbothermic but not of electrolytic metal.

\* J. D. DeHaven, J. A. Davis, A. R. Elsea, K. A. Shumaker, C. T. Greenidge and C. H. Lorig, War Metallurgy Committee Report W-133, July 26, 1944.

The average grain size obtained under the conditions studied is almost independent of temperature between

1400 deg. and 1800 deg. F., the highest temperature yielding slightly coarser grains. While the authors obtained this result for carbothermic magnesium, they think it possibly holds true for electrolytic magnesium. However, grain refinement does occur more rapidly at higher temperatures.

Although there is some evidence that carbides may act as the nucleating constituent, grain refinement may

TABLE I  
Grain Size as a Function of Superheat Temperature  
(Casting Temperature 1400 deg. F.)

Temperature of Superheat* Deg. F.	Average Grain Size—Grains, Per Sq. MM.		
	Cast Iron Mold, 360 Deg. F.	Cold Sand Mold, 70 Deg. F.	Hot Sand Mold, 360 Deg. F.
Unsuperheated**	94	8	9
1400	615	105	122
1500	455	157	117
1600	402	153	114
1700	320	131	108
1800	360	91	34

\* All samples were held a sufficient time at superheat temperature to obtain maximum grain refinement.

\*\* Two minutes at 1400 Deg. F.

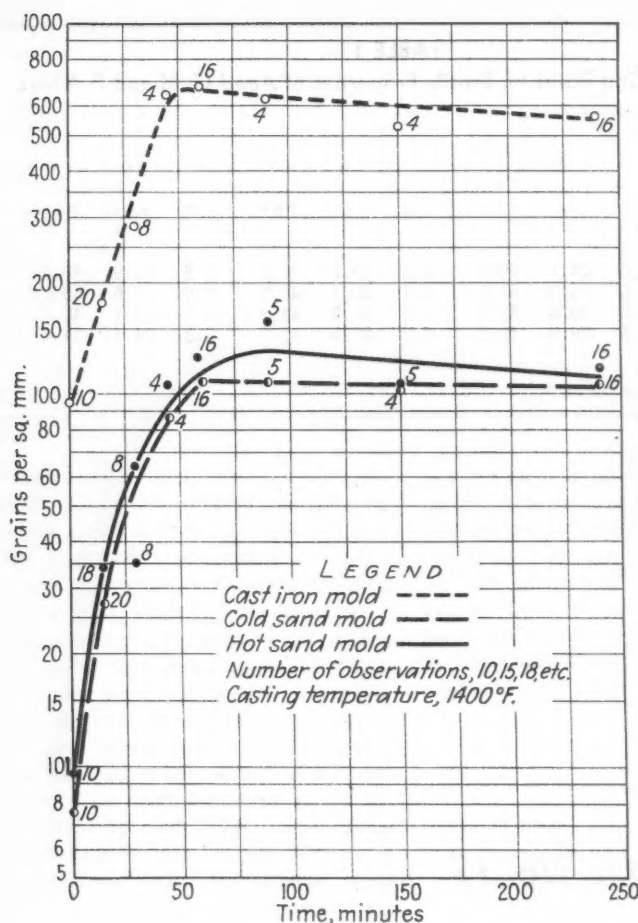


FIG. 1—Effect of time at 1400 deg. F. on the grain size of unsuperheated carbothermic ASTM No. 17 magnesium alloy.

of refining flux having a nominal composition of 52.5 per cent KCl, 40 per cent  $MgCl_2$ , 6 per cent  $BaCl_2$  and 1.5 per cent  $CaF_2$  at 1300 to 1350 deg. F. It was then cooled to about 1250 deg.

F. and a portion weighing approximately 1 lb. was ladled into an iron crucible contained in an electric furnace at about 1250 to 1300 deg. F. and covered with a covering flux of

34 per cent KCl, 42 per cent  $MgCl_2$ , 14 per cent  $CaF_2$  and 10 per cent  $MgO$ . The furnace and contents were then heated to about 10 deg. F. below the desired superheat temperature and the crucible was removed, placed in a holding furnace and held for a measured period of time at superheat temperature. The time of heating was about 1 min. for each 20 to 30 deg. F.

After superheating, the crucible was transferred to a third electric furnace which was at the superheat temperature, the current turned off and the furnace and contents cooled to slightly above casting temperature. The rate of cooling was about 10 deg. F. per min. The crucible was then placed in a holding furnace at casting temperature, and allowed to equalize its temperature for about 2 min.

At the end of the equalizing period, the crucible was removed and the metal cast into a heated cast iron mold, cold baked sand mold, and a heated baked sand mold. The heat molds were at about 360 deg. F. Baked sand molds were used instead of green sand molds in order to eliminate such variables as moisture content, porosity and effect of inhibitors.

After the sprue was removed, the casting was cut into three pieces. The center piece was solution heat treated in a salt bath furnace for 16 hr. at 760 to 770 deg. F. and the bottom piece for 5 hr. only. After solution heat treatment, the specimens were cooled in air, a thin slice was removed from the surface and the new surface was polished, etched and examined.

The grains of the metal as cast were dendritic and grain boundaries were difficult to recognize. After standard solution heat treatment followed by air cooling, the grain boundaries stand out sharply, thus grains were counted only after full solution heat treatment.

In contradiction to published results for electrolytic magnesium, full grain refinement in the carbothermic alloy was obtained at temperatures as low as 1400 deg. F. The time required to obtain this refinement was about 1 hr. at 1400 deg. F., 15 min. at 1500 deg. F. while at higher temperatures it was attained during the heating and cooling cycle, without the necessity of holding at superheat temperature.

A limited amount of work was done at temperatures below 1400 deg. F. Unsuperheated metal held at 1300 deg. F. and 1350 deg. F. experiences a gradual grain refinement. Metal which has been superheated and cooled to these temperatures gradual-

TABLE II  
Typical Data Showing Effect on Grain Size of Time of Holding  
Unsuperheated Metal at 1400 deg. F.  
(Casting Temperature 1400 deg. F.)

Heat No.	Time at 1400 Deg. F., Min.	Grain Size—Grains Per Sq. MM.		
		Cast Iron Mold, 360 Deg. F.	Cold Sand Mold, 75 Deg. F.	Hot Sand Mold, 360 Deg. F.
83	2	70	6	10
85	2	199	12	22
83	15	265	14	45
84	15	350	51	112
85	15	490	112	109
86	15	135	21	22
83	60	1120	92	138
84	60	1040	113	109
85	60	485	119	159
86	60	770	159	103
95	60	605	87	174
96	60	620	127	114
97	60	357	76	175
83	240	586	58	112
85	240	435	79	84
95	240	904	158	138
96	240	1030	142	149



ly coarsens. Grain sizes obtained were intermediate between those obtained with unsuperheated metal and with metal superheated to full grain refinement.

The procedure described under experimental methods was varied in certain respects in order to determine possible effects on grain refinement.

The rate of cooling from superheat to casting temperature was varied from 100 deg. F. to 10 deg. F. per min. without noticeably affecting the grain size.

Identical castings made in close succession from the same crucible proved to have the same grain size, thus indicating that the nucleating constituent, whatever its nature, does not segregate in the bottom or top of the crucible by gravity.

It was found that when two of the four iron crucibles used in a single melt were replaced by graphite crucibles and all four were superheated at 1600 deg. F. by the methods described, the grain size of the castings poured from the iron crucibles were 20 to 30 per cent finer than those from the graphite.

Some superheating was done in 50 lb. iron pots with castings poured in green sand. Under these conditions grain refinement occurred at temperatures as low as 1400 deg. F. and the final grain size depended only a little on the temperature of superheat above 1400 deg. F. Thus the results obtained using the one-pound laboratory crucibles and baked sand molds appear to be applicable to large pots and green sand molds.

without other treatment. Each portion was then cast into 1 in. diameter cylinders in three non-turbulent molds of identical shape. One mold was made of cast iron and the other two of baked sand. The cast iron mold and one of the baked sand molds were heated to 360 deg. F., the other baked sand mold was at room temperature. The freezing times in these molds were about 6 sec. for the cast iron, 1½ min. for the cold baked sand and 2½ min. for the hot baked sand when the casting temperature was 1400 deg. F. The 1-in. cylindrical sections were cut from the sprue and given a complete solution heat-treatment. A fresh surface was then cut and the grain size determined.

Carbothermic No. 17 alloy was treated at 1400 deg. F. by bubbling of natural gas or acetylene or by mechanical agitation. In comparing the results with those obtained by superheating at 1600 deg. F. for 15 min. and with untreated metal held at 1400 deg. F. for 5 min., it was found that the bubbling with natural gas or acetylene produced grain refinement approximately equal to that obtained by superheating. Stirring by hand with an iron rod produced equally fine grains while more vigorous stirring caused increased grain re-

## Grain Refinement of Magnesium Alloys Without Superheating

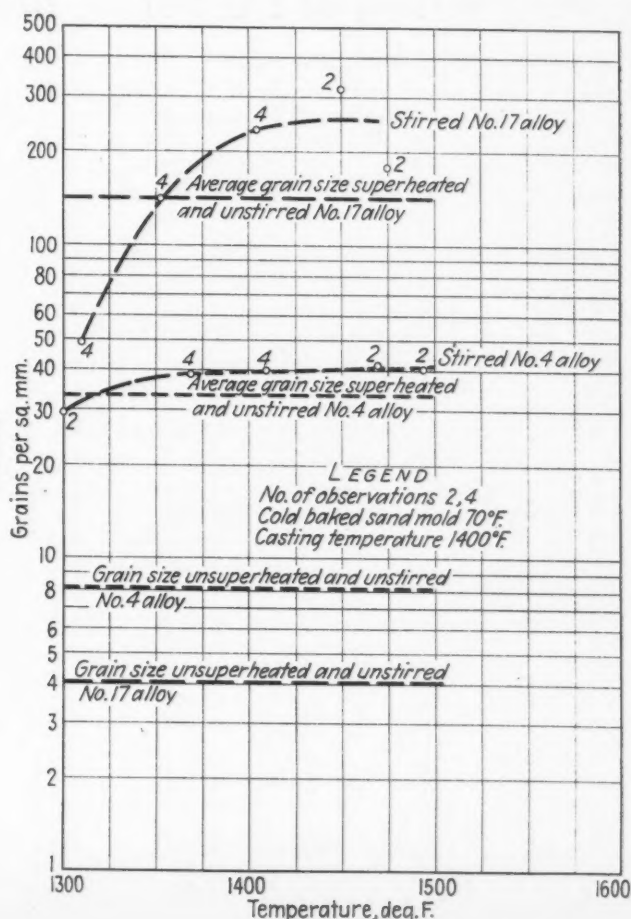
THE possibility of achieving grain refinement in magnesium casting alloys at low temperatures by mechanical stirring of the molten metal for a short time was reported in another paper entitled "Grain Refinement of Magnesium Alloys without Superheating," by Ralph Hultgren and David W. Mitchell of the faculty of the University of California.

The materials studied were the most common American sand casting alloys, ASTM Nos. 4 and 17, and were of both carbothermic and electrolytic origin. Each heat consisted of approximately 5 lb. of alloy melted in a Tercod crucible. It was refined by fluxing with a refining flux made up of 52.5 per cent KCl, 40 per cent MgCl<sub>2</sub>, 6 per cent BaCl<sub>2</sub> and 1.5 per cent CaF<sub>2</sub> at 1300 to 1350 deg. F. After cooling to 1200 deg. to 1250 deg. F., portions of about 1 lb. each were ladled into iron crucibles contained in an electric furnace at about 1250 deg. F. The molten metal was covered with a covering flux of 34 per cent KCl, 42 per cent MgCl<sub>2</sub>, 14 per cent CaF<sub>2</sub>, 10 per cent MgO and then heated to the temperature to be investigated.

Normally each of the four portions was given a different treatment. In a typical case one portion was stirred vigorously for 5 min., acetylene gas was passed through a second portion for 5 min., a third portion was superheated to 1600 deg. F. for 5 min., then

cooled to casting temperature and the fourth was held for 5 min. at the temperature of stirring or gassing

FIG. 2—Effect of temperature of treatment on grain size of magnesium alloys.



finement. Average results obtained for a number of observations are shown in Table I.

Further investigation showed that most of the grain refinement occurred during the first minute of stirring at 1400 deg. F.

Studies of ASTM No. 17 alloy made from electrolytic metal showed the same phenomenon in approximately the same degree as carbothermic metal. Carbothermic No. 4 alloy experienced grain refinement approximately equivalent to that obtained with superheating. (See Fig. 2.)

When stirring was done at temperatures above 1400 deg. F. the tendency to burn was greater and the final grain size obtained was no finer. Above 1500 deg. F. stirring became impossible without protection from air and experiments were not carried out. Somewhat below 1400 deg. F., the grain refinement obtained upon stirring for 5 min. began to decrease as shown in Fig. 2.

The authors offer no explanation as to the cause of grain refinement. Carbothermic metal will refine at 1400 deg. F. if sufficient time is al-

TABLE I					
MOLD	TREATMENT				
	Acetylene, Grains Per Sq. MM.	Natural Gas, Grains Per Sq. MM.	Stirring, Grains Per Sq. MM.	Superheated, Grains Per Sq. MM.	Untreated, Grains Per Sq. MM.
Cast iron.....	242	393	284	357	156
Cold sand.....	115	205	206	147	15
Hot sand.....	128	117	144	128	11

lowed. It might then be considered that stirring merely increases the rate of some reaction, whatever it may be. However, electrolytic metal does not experience grain refinement except at considerably higher temperatures, while its grain refinement on stirring at 1400 deg. F. is equal to that of carbothermic metal.

Grain refinement by stirring does not appear to be due to a reaction with the crucible or stirring rod since the same result is obtained when these are made of graphite as when they are made of iron.

lems, according to Henry and Cordiano, are to devise:

(1) A die steel capable of withstanding high pressures at elevated temperatures.

(2) A high temperature lubricant capable of preventing excessive die wear and welding of the compact to the die walls.

(3) A method of retaining a neutral or reducing atmosphere in the compacting zone of the die assembly.

(4) A means of ejecting the hot pressed specimen into a neutral atmosphere until reasonably cold.

(5) A means of confining the heat developed to the die cavity.

(6) A design of a soundly engineered machine for mass production. All these requirements must be met or by-passed before hot pressing can become a successful commercial procedure.

In making their tests, Henry and Cordiano used an electrolytic iron powder having the following characteristics: Apparent density, 2.4 gm. per cc.; flow for 50 gm., 46 sec.; and hydrogen loss, 0.34 per cent. Chemical analysis of the iron was 0.005 C; 0.002 Mn; 0.003 Si; 0.001 P; 0.004 S, and 0.008 Ni, and a screen analysis as follows:

	Per Cent
+100 .....	1.0
-100+150 .....	10.5
-150+200 .....	21.5
-200+250 .....	11.0
-250+325 .....	13.0
-325 .....	43.0

To facilitate handling during hot pressing, the iron powder was pre-compacted cold at 20 tons per sq. in. into 3x3x1/2-in. specimens. The die lubricant used was made by dissolving 1 gm. of stearic acid in 20 cc. of carbon tetrachloride. To provide high temperature lubrication, the hot pressing punches and die parts were rubbed with flake graphite. Before the furnace was brought to tempera-

## Hot Pressing of Electrolytic Iron Powders

IN a paper entitled the "Hot Pressing of Iron Powders," O. H. Henry, associate professor of metallurgical engineering, Polytechnic Institute of Brooklyn, and J. J. Cordiano, research engineer, Hardy Metallurgical Co., New York, reported on their investigation of the properties of hot-pressed specimens of electrolytic iron powder.

Although the application of heat during the compressing operation results in compacts practically free of voids due to increased plastic deformation of the powder particles, this process has many attendant problems, the authors point out, which until solved preclude its use in the manufacture of precision parts.

The more important of these prob-

TABLE I  
Tests on Hot-Pressed Iron Powders

Temperature, Deg. F.	Time, Sec.	Density, Grams Per CC.	Tensile, Strength, Lb. Per Sq. In.	Elongation in 1 In., Per Cent	Brinell Hardness, 500 kg Load
932	50	6.31	26,200	0.0	50
932	150	6.38	25,500	0.0	51
932	450	6.71	39,800	1.0	63
1112	50	6.70	36,900	0.5	62
1112	150	6.89	40,800	1.0	77
1112	450	7.05	48,800	2.0	80
1292	50	7.32	47,800	1.0	90
1292	150	7.52	57,300	12.0	95
1292	450	7.58	57,500	27.0	100
1436	50	7.59	54,100	22.0	101
1436	150	7.71	52,400	32.0	93
1436	450	7.76	52,900	37.0	96

## Problems Involved in Pressing Compacts Having Complicated Shapes

ture the system was purged with dry nitrogen in order to prevent oxidation of the die parts and to provide a means for purging the hot die cavity with hydrogen without forming an explosive mixture. When the furnace had reached temperature, purified hydrogen was passed through the system to replace the nitrogen and the escaping hydrogen was ignited and allowed to burn. The loosely pressed compact was placed in the heated die and left to soak for 10 min. A pressure of 10 tons per sq. in. was applied for the predetermined time interval, 50, 150 or 450 sec. The specimen was ejected and after it had cooled, the hydrogen was replaced with nitrogen and the specimen removed. To conform to standard specifications for  $\frac{1}{4}$  in. diameter tensile specimens, the compacts were machined to size.

Results of these tests are tabulated in Table I and from these it can be seen that time and temperature have a potent influence on the physical and mechanical properties of hot pressed iron powders. These properties are dependent upon the amount and rate of diffusion, which in turn depends on the number and area of intra-particle contacts, as well as on the amount of plastic deformation to which the compact is subjected. Increasing temperature and time at temperature under sustained pressure tends to increase each of the above effects individually with cumulative effects.

It was also seen that increasing temperature resulted in a decided increase in density while increasing time at temperature had a similar effect but to a lesser extent. The hot pressing process results in increased tensile strength and elongation. The increase in tensile strength up to 1292 deg. F. is caused by increasing intra-particle bonding. The increase in contacting particle surfaces and diffusion rates with increasing temperature are mainly responsible for this bonding.

The elongation values, though nominal at the lower temperatures, increase rapidly at the higher temperatures because of the strong bonding resulting from hot working and the complete recrystallization of the grain structure.

From their investigation, Henry and Cordiano conclude that properties obtainable from hotpressed iron powders are far superior to the properties of coldpressed and sintered iron powders. However, the time, temperature and pressure requirements are too severe for present commercial equipment.

**I**N discussing the problems arising from the pressing of compacts having complicated shapes, Claus G. Goetzel, works manager, American Electro Metal Corp., Yonkers, N. Y., pointed out that three main factors influence the attainment of uniformly dense compacts. These are in order of importance: (1) The compression ratio of a powder, which is the final density of the compact over the apparent density of the powder used. Uniform density of the final compact is directly proportional to the compression ratio of the powder. (2) Specific pressures used during molding have a distinct effect on uniformity especially where high pressures are required before maximum density can be reached. (3) Plasticity of the powder particles and the application of lubricants to the walls of the die cavity and between the particles have genuinely beneficial effects on the molding process.

A practical method of molding compacts of complicated shape has been worked out to give satisfactory results. This method is based on the fact that molded bodies will have a uniform density only if the compression ratio remains the same over the entire cross-section of the compact at any stage during the pressing operation. This can be accomplished by in-

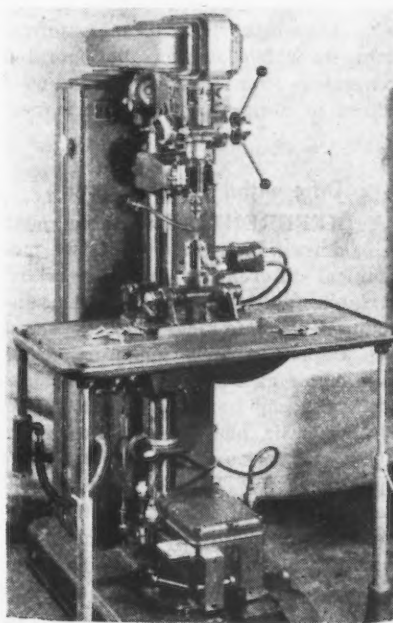
terrupting the molding process at short intervals and sintering the porous shapes. Another method used to stabilize the compression ratio is considerably simpler and permits molding to final density in one pressing operation.

Here the powder is put into a cavity bounded on two sides by the die walls but whose top and bottom faces are made of segments of top and bottom punches. These segments are capable of independent motion with variable speed and of the independent application of pressure which is limited only by the maximum press capacity.

This type of molding may be carried out in a heavy hydraulic as well as in a quick acting mechanical press. A press of the latter type having 100 tons total capacity is now in operation and is producing compacts at a rate of 10 pieces a min. in the manufacture of armatures for telephone field generator sets. The advantage of this method is the individual action of each punch segment with regard to location, motion, velocity and application of pressure, maintains a constant compression ratio over the cross-section of the piece and eliminates the lateral motion of particles during the molding process.

## Tilting Fixture Speeds Tapping Job

**A**SPECIAL tilting fixture used in conjunction with a standard Zagar air operated holding fixture permits this Warner & Swasey precision tapping and threading machine to turn out one piece every 3 sec. Tipping the fixture about 20 deg. for loading and unloading saves the time that would be consumed in raising the spindle more than 1 in. above the work. To load, the operator steps on a treadle which tilts the fixture forward. Spring pressure returns it to the operating position when the treadle is released, and a microswitch starts the tapping cycle. When the cycle is completed, the machine stops. Automatic valves were installed at the control box to open and close the collet when the fixture is tilted for loading and unloading. Collet design is such that there is no vertical movement in closing.



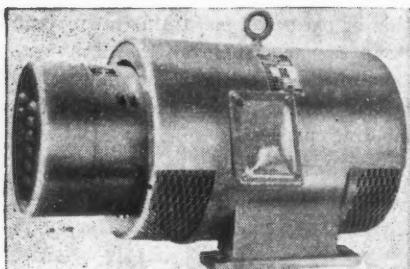


# New Equipment . . .

## Power Transmission

. . . Recent developments in a.c. generators, power transformers, motors and other power transmission devices are described in the following pages.

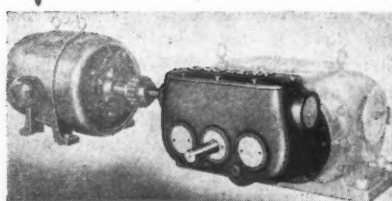
**A** LINE of a.c. generators of the revolving field type has been announced by *Electric Machinery Mfg. Co.*, Minneapolis. Built in ratings 6.25 kva. 1800 r.p.m. and 1200 r.p.m., to 18.7 kva. 1800 r.p.m., single and three phase, standard and close regulation, 120, 120/208, 240 and 600 volt, these generators can be supplied as two-bearing units for belted or coupled duty, or single bearing for close coupling to driving engine. Drip-proof generator and exciter construction is standard. Features of the generator



line include enclosed ball bearings with sealed lubrication, high torque dampers which keep parallel operated generators running smoothly and easy access to excited brushes for inspection.

### Differential Variable Drive

**A** DIFFERENTIAL variable speed drive which consists of two mechanical differentials and a standard variable speed reducer has been announced by *Ohio Gear Co.*, Cleveland 10. Using an 1800 r.p.m. squirrel-cage motor as a source of power, output speed can be obtained from 0 to 800 r.p.m. in one direction, or from 400 r.p.m. forward through 0 to 400 r.p.m. reverse. Torque remains constant throughout the entire range. By means of a control box furnished with the unit, the output shaft can be made to duplicate any movement of the control shaft. The control shaft can be



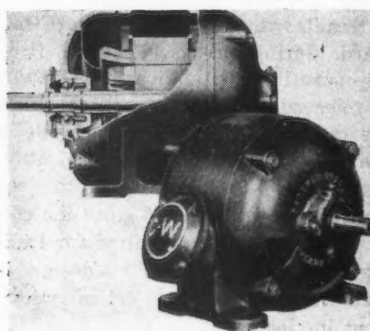
operated with only a few pounds torque while the output shaft will deliver the full power of the unit.

### Roller Bearing Shims

**A** RTUS shims for adjusting Timken roller bearings for all applications where temperatures do not exceed 175 deg. F. have been announced by *Industrial Products Suppliers*, 2 Broadway, New York 4. The shims are non-hygroscopic, are impervious to oils and greases and maintain the same even thickness under most normal operating conditions, it is said.

### Semi-Open Type Motor

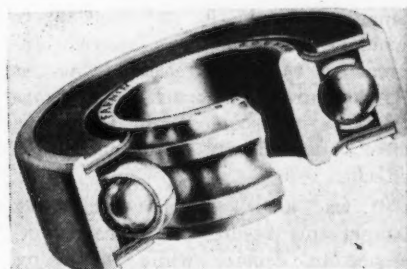
**A** MOTOR combining the surplus capacity of the conventional open motor with protection against dripping liquid, falling metal chips and other foreign matter has been developed by *Crocker-Wheeler Div.*, *Joshua Henry Iron Works*, Ampere, N. J. Rated at 40 C. rise, full load continuous duty with a 15 per cent service factor, the motors are available in



sizes up to and including the 284 frame. Centrifugal seals permit the use of softer grease for better lubrication and longer bearing life.

### Sealed Ball Bearing

**A** SEALED ball bearing, known as Plya-Seal, containing a sealing element which consists of a diaphragm type contact seal comprising two members—a flat flexible sealing washer of synthetic rubber-impregnated fabric



and a split retaining ring of spring steel—has been announced by *Fafnir Bearing Co.*, New Britain, Conn. Firmly held in the outer ring, the sealing washer does not rotate with the inner ring but is in contact with a ground groove to form an effective seal with a minimum of friction. It can be easily removed and replaced to allow inspection, washing and regreasing of the bearing.

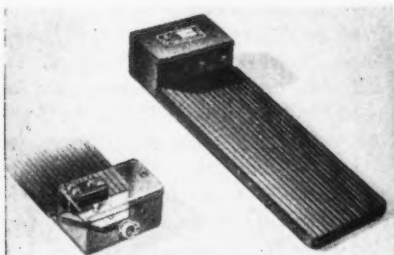
### D. C. Power Supply Units

**A** LINE of metal enclosed high voltage d.c. power supply units available in ratings up to 50,000 volts d.c. has been announced by *General Electric Co.*, Schenectady, N. Y. These units provide a source of d.c. power for applications such as testing of electric equipment, precipitation, induction heating, radio and miscellaneous industrial and electronic applications. Each unit consists of a full-wave kenotron rectifier, a filter to limit voltage ripple to 1 per cent or

less and complete control equipment. The d.c. output voltage can be controlled, from zero to maximum, by means of a motor-operated, dry type, variable autotransformer. An automatic solenoid operated discharge switch is interlocked with the main supply in such a manner that it automatically short-circuits the rectifier and discharges the filter capacitor through a resistor when power is removed.

#### Foot Switch

A FOOT switch for actuating one to eight circuits, designated the Model MF and said to be the flattest foot switch ever manufactured has been announced by *General Control*



Co., 1200 Soldiers Field Road, Boston 34. The foot rest is  $\frac{1}{2}$  in. above the floor and requires only  $\frac{1}{16}$  in. throw which permits the operator to support his whole foot nearly at floor level.

#### Power Transformer

PRESSED steel end covers instead of steel castings for their air cooled transformers have been announced by *Acme Electric & Mfg. Co.*, Cuba, N. J. This redesign has reduced the weight of the transformers an average of 22 per cent and overall dimensions in some sizes have been reduced as much as  $4\frac{1}{2}$  in. The rated output of the respective units is not affected and the temperature rise remains at 55 deg. C. continuous. The design covers all Acme air cooled transformers, auto and insulated types from 1 kva to 15 kva with primaries up to 2400 volts.

#### Oilless Bearing Stock

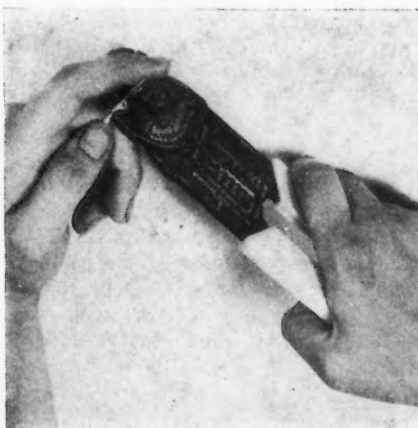
SEVERAL dozen new sizes of cored and solid bar stock in Oilite materials, ranging from  $\frac{3}{8}$  to 12 in. in diameter, have been announced by *Amplex Div., Chrysler Corp.*, 6501 Harper Avenue, Detroit 31. Outstanding features of the Oilite bar stock are said to be self lubrication and greater load carrying capacities.

#### Circuit Breaker

A 100 amp. De-Ion circuit breaker which requires less space and permits lighter structures for distribution panelboards, builtin applications and bus duct plug-ins has been announced by *Westinghouse Electric & Mfg. Co.*, Pittsburgh 30. All ratings are available in one compact breaker with uniform pole spacings and terminal arrangement, providing complete interchangeability between ratings. The new F frame permits for the first time a 100 amp., 600 volt a.c. or 250 volt d.c. breaker in the same space formerly required by the 50 amp., 600-volt a.c. or 250 volt d.c. rating. Equipped with thermal and instantaneous magnetic trip elements, the fuseless circuit breaker permits maximum loading circuits and fast resumption of interrupted service. Contact pressure increases with wear, thereby prolonging the life of contacts and breaker. Silver alloy contacts give increased contact life and prevent "freezing." Both two and three poles units are available.

#### Solderless Wiring Tool

A HAND tool which combines all the steps involved in preparing a wire for a solderless terminal and crimping the terminal to the wire has been announced by *Aircraft Marine Products Inc.*, 1591L North Fourth Street, Harrisburg, Pa. The tool also includes a wire cutter and an insulation stripper with the correct stripping length clearly indicated. Terminal stud hole sizes are marked on the tool for quick checking. Three types of terminals for wire sizes 22 to 10 are crimped by the tool—AMP flag type, AMP standard (Type B) and AMP one-piece terminal. The tool is pocket size. Handles are fully insulated and are of molded plastic.



#### Circuit Transformers

POWER circuit transformers with resetting breakers in capacities from 100 to 750 watt have been announced by *Jefferson Electric Co.*, Bellwood, Ill. Transformers of these capacities are used, mounted directly on machines to step down the 550, 440 or 220 to 110 volt for various electrical appliances. Flexible cable or conduit can be run from the wiring compartment to the motor or appliance.



#### Selective Speed Gearshaft Drive

A UNIT designed to power machine tools and other equipment requiring motor capacities of 1 hp. or less has been announced by *Lima Electric Motor Co.*, Lima, Ohio. The unit is rated at  $\frac{1}{2}$  and  $\frac{3}{4}$  hp. at 1200 r.p.m. and 1 hp. at 800 r.p.m. The unit weighs only 85 lb., has an overall length of 18 ft. and an overall height of 12 in. The unit is equipped with anti-friction bearings throughout. The shaft and all gears are of heat treated alloy steel, running in a bath of oil. Shifting is done by means of a small lever which can be extended to any unit, identified as Type R, is designed for continuous operation, with ample overload capacity. A LIMA semi-enclosed, drip-proof, ball bearing motor of either 2 or 3 phase, 50 or 60 cycle, 220, 440 or 550 volts, is furnished as a standard part of the unit. Type R is reversible in all speeds with the use of a reversing drum control. Single phase units in above sizes will be available when conditions permit.

#### Circuit Breaker

RESET protection in circuit breaker form, interchangeable with all 5 A G fuses both for new equipment and replacement has been announced by *Littelfuse, Inc.*, 200 Ong Street, El Monte, Calif. The No. 1561 Breakerette is of push breaker type,



rated at 32 volts a.c. or d.c. Break is snap action capable of interrupting short circuits of 1000 amp. in ratings up to 5 amp. and 2500 amp. in ratings over 5 amp. capacity. Time characteristics of the fuses are duplicated electrically. It is provided with 5 A G caps to fit into standard 5 A G fuse clips and can be used wherever 5 A G fuses are employed. When the bi-metal releases the push-button on which it acts directly, a double break of the circuit is effected. The actual breaking distance is 5/16 in., ample for the voltage rated. To reset, the button is merely pushed into its bottom position with respect to the case. Both trip-free and non-trip free features are provided, the trip-free by a shield attached to end caps, and pivoting on them. The shield can be swung aside for resetting, the Breakerette being removed from the clips. In the non-trip free the shield is not used.

#### Synthetic Rubber Belt Dressing

A STANDARD dressing for rubber belts which was satisfactory on belting made with natural rubber also will prove effective with the new GR-M synthetic rubber belting, according to an announcement by B. F. Goodrich Company, Akron, Ohio. The synthetic belting will not disturb the dressing as quickly as natural rubber and care has been taken not to apply more than necessary, as this may result in slippage, it is said. Use of dressing allows the belt to produce greater horse-power and operate under a load with less tension than a belt without dressing. The increase in efficiency of a GR-M synthetic belt properly treated with dressing over one in a similar installation not treated is proportionately the same as with natural rubber belting, it is said.

#### Electronic V-S Drive

A N electronic system of adjustable speed (v-s) drive which is operated from the regular polyphase a.c. distribution system, 22, 440, or 550-volt, 2 or 3 phase, 25, 50 or 60 cycle, to provide speed ranges of 20 to 1 or better is announced by the Reliance Electric & Engineering Co., Cleveland. A substantially wider range of operating speeds can be obtained where, as in machine tool feed applications, the actual motor load is light. At the outset the electronic drive will be available in 1, 1½, 2, 3 and 5 hp. sizes. With the electronic system somewhat

closer regulation is possible for those applications where wide changes in load are actually to be experienced. Smaller speed controlling elements can also be used with the electronic system of V-S drive. As with the rotating system of V-S drive it is possible with the electronic unit to obtain controlled starting torque and controlled torque for braking and stopping. Starting, stopping and reversing operations can be controlled from one or more points about the driven machine. The functioning of the electronic system is based on voltage control, the same as in the rotating system. All panels are arranged with individual terminal boards for ease and speed of wiring individual groups of controls.

#### Metal-Clad Switchgear

A Metal-Clad switchgear with self-contained panels which carry instruments, relays and control equipment has been announced by Westinghouse Electric & Mfg. Co., Pittsburgh 30. All panel mounted devices are flush type and the relays are the new Flexitest or detachable design with self-contained test switches. The test switch blades also serve as disconnecting means which permit quick removal of the chassis carrying the relay element and enable the maximum accessibility to all parts. Flexitest relays simplify wiring at the rear of the panel since connections between the test devices and the relay are completely internal. The combination of the instrument and control panels with the switchgear and breaker structure is almost universal practice in steel mills, except for the main switchgear in generating stations. This results in reduction in space, installation time and cost and improvement in operating efficiency and convenience. The complete equipment is factory assembled and tested so that it can be put into operation with the minimum of field testing.

#### Fan-Cooled Worm Gear

A FAN-COOLED worm gear has been announced by De Laval Steam Turbine Co., Trenton 2, N. J. The unit employs forced air cooling which removes the heat so effectively that the capacity of the gear is doubled for all ratios and sizes at 1750 r.p.m. This permits the use of smaller, lighter and less expensive speed reducers without sacrifice of

efficiency or durability. A fan mounted on the worm shaft draws air at high velocity over and around heat dissipating ribs upon the air side of the oil reservoir housing the gearing. The use of a double wall greatly increases the effectiveness of the cooling by confining the cooling air to the housing and thus securing the close air-to-metal contact necessary for maximum heat transfer.

#### Rectifier Unit

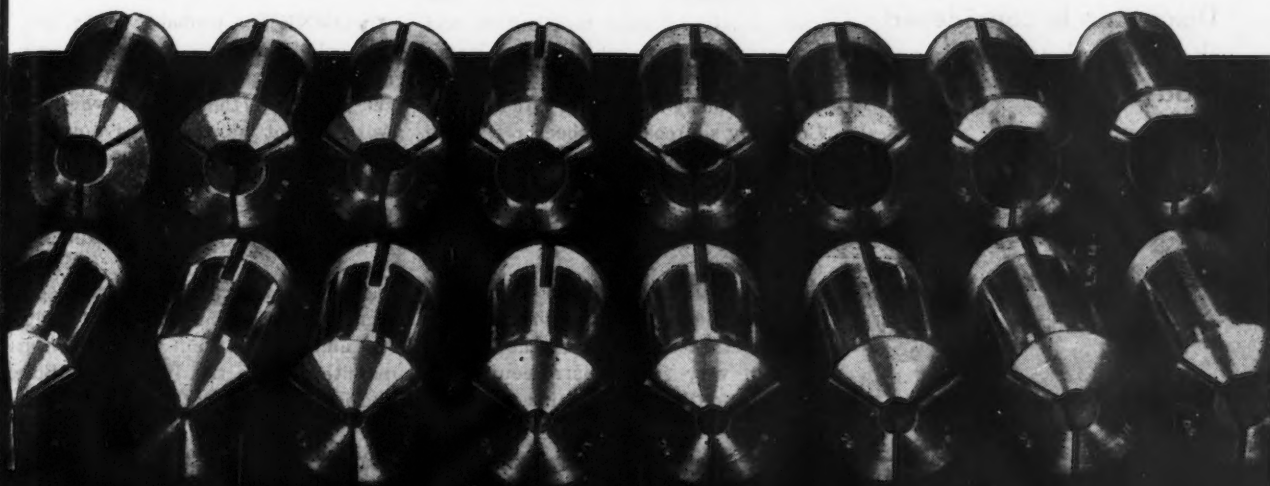
S ELENIUM rectifier power supply units of 1, 5 and 10 amp. at 115 volts, d.c. designed for use in the operation of magnetic equipment, d.c. motors, relays, circuit breakers, carbon arc lamps, battery chargers and other applications are being manufactured by Federal Telephone & Radio Corp., Newark, N. J. Designed for wall or bench mounting with no special connections needed, the units are equipped with a 6-ft. input lead with male connector and a standard convenience receptacle for the output. The 10 amp. unit is furnished with an 11-point selector switch for maintaining 115 volts from no load to full load. Powered by convection cooled Federal selenium rectifiers, the units are conservatively rated to assure trouble-free performance. As the rectifiers have no moving parts they are not affected by normal vibrations. They can stand as much as ten times their rated loads for short periods of time without damage.

#### Circuit Breaker

A CIRCUIT breaker relatively free from the effect of extreme high and low temperature has been announced by Littelfuse Inc., 200 Ong Street, El Monte, Calif. The actual trip temperature of the breaker without flow of current is 350 deg. F. ambient temperature. This resistance is accomplished by the bi-metal design. The high differential between the operating and breaking temperatures is a distinguishing characteristic of the circuit breaker. The range is 5 to 50 amp. at 32 volts, a.c. or d.c. It is capable of breaking 2500 amps. on short circuit. It meets the requirements of holding for one hour at 115 per cent of rated current, breaks within the hour on 138 per cent of rated current; breaks at 200 per cent of its load between 10, and 100 sec. These tests are all at the ambient temperature of 77 deg. F. ± 1.8 deg. F.



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# Assembly Line . . .

STANLEY H. BRAMS

• Management and labor stage another sparring match to enlighten the Mead Committee inquiry in Detroit . . . Discipline is considered the big shop problem today.



**D**ETROIT—Management and labor put on their boxing gloves once again this past week and went through the customary warm-up exercises in their respective corners of the automotive ring. Their new bout will be no more than a short sparring match, but it may pave the way for a return engagement of more serious proportions. The occasion, to continue the metaphor, is a sort of Charity Show honoring the appearance in Detroit of Senator Mead's Committee investigating war production and manpower problems.

The first move was made by the Automotive Council for War Production and its quietly aggressive director, George Romney, from whose corner came an eight-page statement centered about the theme that "the real difficulties affecting war production in automotive plants arise largely from the effort being made by union representatives to usurp the function, responsibility and authority of management." The CIO United Auto Workers Union, speaking through hard-boiled secretary George Addes, thereupon threw a verbal punch of its own, asserting that this was "more of the same hollering" which had come from the auto industry since 1937.

Obviously nothing will come of such point and counterpoint for the time being except rather discordant music. But it is not too hard to see that both management and labor—probably more the former than the latter—are battenning down their hatches for an

ultimate full-dress battle for position which can be expected to break out after the war ends.

Management appears more and more ready to shed the caution and conservatism with which it has largely clothed itself since unionism first came seriously to Detroit late in 1936. Company sources have been too prone to wait to be hit before punching back. The change from this defensive attitude has been gradual but not unnoticeable, and the Romney statement is certainly evidence that it has traveled beyond the diaper stage.

Romney has a good thesis. His point is that discipline in the plants, never a very sharp instrument since 1937, has dulled to the point that it is all but useless. This has resulted in part, he maintains, from a considerable government support for the position that "labor can do no wrong," and from interference by labor with management functions. In other words, he indicates that grievance procedure has completely broken down and that there is no longer a boss in a factory—a condition which has about

as much influence on work output as would the teacher's absence in a grade school room.

**R**OMNEY is probably right. Discipline has been largely impaired by the fact that shop stewards have set policy for the men on whether to work or not to work, and how much to do. Often before orders are given to change a job, its timing, or its personnel, the steward's decision on it has been made and a deadlock ensues. Labor's answer is the strike—once of the wildcat variety, now somewhat more legitimized by familiarity and association. Thereupon the dispute goes to the War Labor Board and is ultimately settled by an outside agency which may or may not be familiar with the background of the case—or, management may give in to avert tieup, delay, confusion, ill feeling, and probable ultimate defeat. None of that is in the Romney presentation, but it is the considered analysis of keen management men who expect that there must be an ultimate showdown on the discipline line, and

**ROAD TO MANILA:** This aerial view shows the main highway to Manila just north of Clark Field. In the center is the frame of a bridge demolished by the Japanese. A detour, which is being leveled, cuts through the left foreground.



# NEW TAP, DEVELOPED FOR BOTTOMING HOLES IN STRINGY MATERIAL, SOLVES OLD PROBLEM

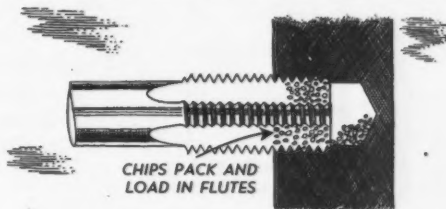
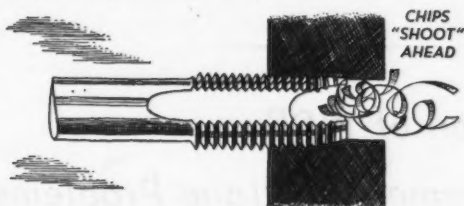
[A GTO SHOW-HOW REPORT]

1 On a routine call at an aircraft factory, "Greenfield" distributor's salesman was told—in casual way—that production could be speeded up on a certain job except for traditionally poor performance of ordinary bottoming taps in threading blind holes in stringy materials.



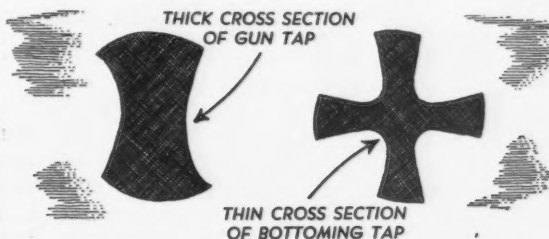
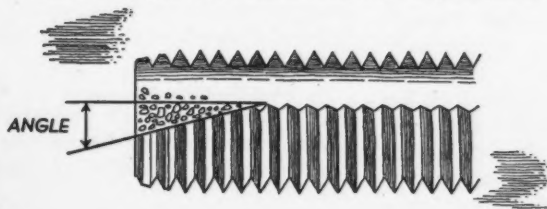
2 Conversation was repeated to "Greenfield Man" in that territory who in turn took it up with "Greenfield" engineers at home office. In spite of fact that this was an accepted limitation of ordinary bottoming taps, "Greenfield" research laboratory tackled this old problem again.

3 Experience showed that "Gun" tap with its clean shearing action was ideal for this material but that cutting angle which gives this shearing action shoots chips ahead of the tap, normally restricts use to through holes or blind holes with plenty of chip room at bottom.



4 Action of ordinary bottoming taps tends to "load" chips in flutes, causing torn threads at bottom of holes when chips pack down; traditionally accepted as unavoidable. These taps are also somewhat more susceptible to breakage because of smaller cross-sectional metallic area than "Gun" taps.

5 "Greenfield" researchers working on theory that "Gun" shearing action combined with chip breaking action would solve this problem; finally developed a cutting angle on a bottoming "Gun" tap which gave desired result. Additional flute space at point of tap provided extra room for chip disposal.

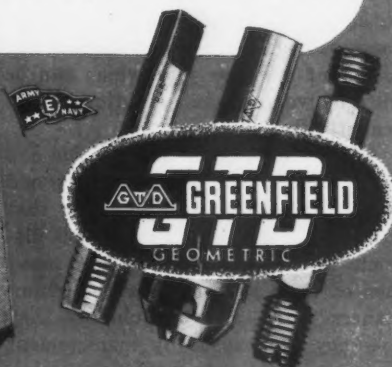


6 New tap retained advantages of "Gun" tap's shearing cut and heavy cross-sectional metallic area for maximum strength, tap could cut full clean thread to bottom of hole. Tap breakage was reduced.

## Results:

(1) Aircraft manufacturer found new "Bottoming Gun Tap" could be used on screw machines putting whole operation on production basis for first time... (2) New tap, tested on similar operations in plants of business machine and optical instrument manufacturers, gave same gratifying results. "Greenfield" could SHOW HOW problem had been solved before... (3) A new and valuable tool was added to "Greenfield's" line.

"Greenfield's" SHOW-HOW is KNOW-HOW in action! ON THREADING PROBLEMS, CALL YOUR "GREENFIELD MAN" THROUGH YOUR "GREENFIELD" DISTRIBUTOR!



GREENFIELD TAP and DIE CORPORATION  
GREENFIELD • MASSACHUSETTS



whose attitudes may be behind the stiffened tone of the dossier.

Along with Romney's remarks was a highly interesting tabulation of strike causes, prepared by one large automotive company. The company was unnamed, but the General Motors penchant for analysis leads to the belief that it was the subject firm. In the segment following, column "A" is the number of work stoppages for the year, and of these "B" is the number of stoppages resulting from refusal to meet production standards; "C" is the number caused by violation of established shop rules other than production standards; and "D" is the number caused by violation of federal or state laws and regulations not covered by shop rules:

	A	B	C	D
1939	40	1	2	—
1940	32	1	3	—
1941	41	2	7	—
1942	41	1	2	2
1943	91	3	14	6
1944	109	12	38	4

The growth of strikes caused by discipline breakdown is thus graphically indicated. From 7.5 per cent in 1939 to 49.5 per cent in 1944 is a rather frightening change. In 1944 that 49.5 per cent of the tieups involved 31,496 men out of 42,917 participating in all strikes (73.4 per cent) and caused loss of 898,062 of 1,098,540 lost man-hours (82.8 per cent).

LABOR'S retort to this was loud and somewhat empty. Addes denied that labor had any designs on management controls of production and operations, as broadly inferred in the Romney presentation. The UAW statement then went on to outline a four-plank program to be recommended to the Mead investigators: (1) Check into labor hoarding and manpower utilization in the plants; (2) install a system of voluntary transfer of manpower in the Detroit area, so workers could move from job to job without loss of seniority or income as the need arises; (3) stop the hiring of men for jobs which can be filled by women; and (4) adjust wages realistically.

Addes may have a point in his call for an inquiry into labor hoarding and utilization. It is entirely likely that some of the plants in the Detroit district, as elsewhere, have too many men on their payrolls. If such circumstances exist—and undoubtedly they do—they are caused by management desires to hold onto workers, specialists as well as common labor, in order to be protected against amplified re-

quirements which may come when a new contract is obtained. Conceivably, if enough of this goes on, and if all employers would drop their surpluses, there might no longer be manpower tightness. But in the absence of such concerted, perhaps impossible, action, the premise must be accepted that there is a manpower shortage, and that the fault in labor hoarding therefore lies not so much with the employer as with the low reserve of workers and with the system which makes it so hard for him to dip into that reservoir for new needs. At any rate, it is no cheery sight to walk through plants in tight labor areas like Detroit and find a disproportionate number of men and women workers about as hard put to pass their time as sunbathers on the fine white sands of Miami Beach.

The Addes' call for a transfer system to protect seniority and income is rather feeble, and Addes probably knows it. In the first place, seniority

in original plants of employment has been protected since the early days of the war and the then-concurrent need for widespread transfer of employees. Shifting is a solution which has not worked too well. Difficulties in becoming accustomed to new production environments interfere. Transportation to new, often far-away, places of employment poses a problem. Wage levels vary and if they are adjusted as Addes urges, they will completely upheave the faintly flickering Little Steel formula and cause an equally fine confusion in prices, profits and prospects of the affected firms.

As for a ban on male hiring for jobs which women can do, this policy is not altogether new. And as for adjustment of wages, this proposal appears about as consistently as Harry Lauder farewell tours of the dear, departed past, and can similarly be regarded as part of a long tradition whose effect, while diminishing, will probably continue to have an ultimate effect at the pay windows.

## Aircraft Division of WPB To Handle Commercial Plane Problems

### Washington

• • • WPB has organized an Aircraft Division which will handle problems affecting the production and distribution of commercial aircraft. These duties, according to Henry P. Nelson, will be performed through four branches, including maintenance, requirements, production and planning. The Project Rating Branch has been abolished and its functions will be undertaken by the Project Review Section of WPB's Construction Bureau, and aircraft facilities and construction projects applications will be routed directly to the Project Review Section for processing. The Aircraft Priorities Branch also has been abolished and a large part of its functions have been transferred to the Maintenance Branch.

Functions of the Aircraft Division were outlined by Mr. Nelson as follows:

1. To keep at peak performance the operation, maintenance and repair of all civilian aircraft, airlines and aircraft facilities (non-military).
2. To set up plans and procedures for programming the production of

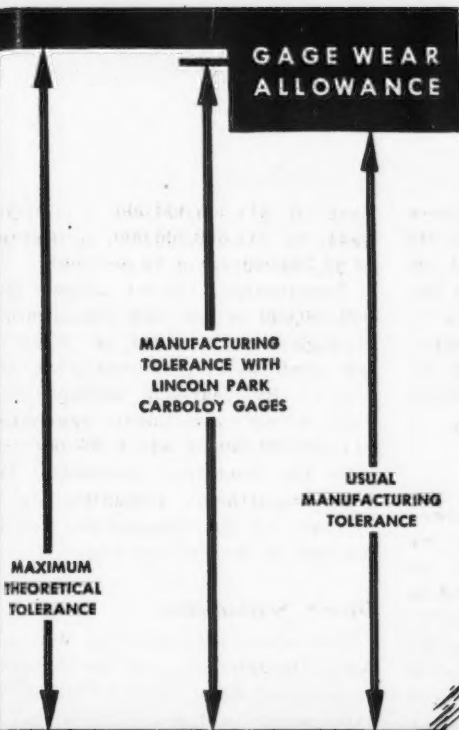
commercial aircraft and maintenance parts.

3. To establish and maintain working relationships with other government agencies having a direct or indirect interest in the production, maintenance or distribution of commercial aircraft and aircraft maintenance parts.

4. To establish and maintain working relationships with industry advisory committees as regards the production and distribution of commercial aircraft.

5. To set up and maintain a continuous study of aircraft production facilities and manpower to the end that definite plans can be made that will help the aircraft industry readjust its methods of operation and production into peacetime economy.

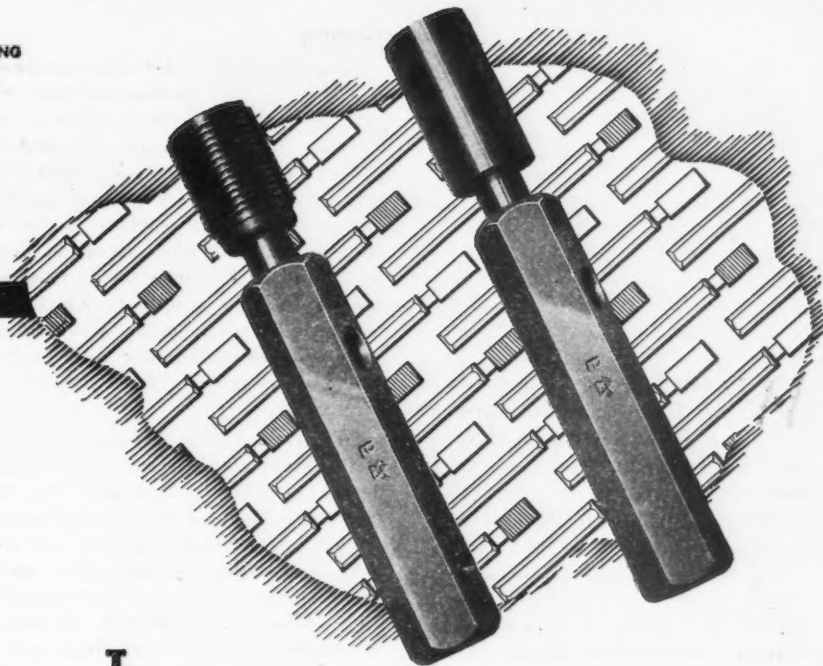
6. To secure from other offices or bureaus of WPB, Army, Navy and other Federal agencies, State agencies, civic or business groups or associations such statistics or data as may be pertinent to post V-E and V-J Day (including transition period) problems of reconversion of the aircraft industry from war to peacetime production.



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**At Least 50 Times the  
Useful Inspection Life of  
Ordinary Steel Gages.**

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Produced Extremely  
Close to Required Limits**

**I**n the many plants where Lincoln Park Carboly gages are being used for the inspection of parts produced in mass volume, records invariably show savings of thousands of dollars in gage costs alone. This is the result of greater wear-resistance and longer gage life which, in some cases, has exceeded 200 times that of steel gages.

In addition, even greater savings—which cannot be actually recorded—are made possible because Lincoln Park Carboly gages can be specified extremely close to required limits. With wear allowances reduced to a minimum, manufacturing tolerances are automatically increased. Important and expensive parts made to close limits are not rejected because of inaccurate inspection with gages of other materials which must be produced to allow for customary wear.

Carboly plug, ring, thread plug, and sizing gages and many precision tools are promptly available from Lincoln Park—the company that has had wider experience in the use of this wear-resistant material for precision applications than any other manufacturer. Our new catalog contains complete information. Write for it today.



# **LINCOLN PARK INDUSTRIES, INC.**

*Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.*

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**• Contract settlement work proceeding . . . December dollar value highest of any month since war began . . . Few cases winding up in the courts.**

**W**ASHINGTON — Contractors and the procurement agencies have been doing a lot of agreeing, it is evident from the recent report to Congress of Robert H. Hinckley, Director of Contract Settlement.

Thus far eight cases have been reported in which contractors have indicated an intent to appeal to the Contract Termination Appeal Board. Five of these involved cases under the jurisdiction of the War Department, one under RFC and two under the Civil Aeronautics Administration. Four of the cases were appealed because of informal commitments. In one of the cases an oral agreement has been reached on the terms of settlement and Mr. Hinckley said that it is unlikely that an appeal will be taken.

One case is now pending before the War Department Board of Contract Appeals, but no agency appeals are pending in the Navy Department, the Treasury Department, the Maritime Commission or the RFC.

In the Court of Claims, eight cases are pending with suits against the government by contractors, with two of the cases filed prior to the effective date of the act. Four cases are pending in state courts, in which subcontractors are suing prime contractors on claims arising out of subcontracts which have been terminated. The government is the real party of interest in these cases, since it will be compelled to settle with the prime con-

tractors under terminated cost-plus-a-fixed-fee contracts on the basis of the amounts covered and the legal expenses of the litigation. For this reason, the Justice Department has intervened in each case at the request of the particular agency which entered into the prime contract involved.

Highlights of the report follow:

#### **General**

In a sampling of 500 cases reviewed by OCS, it was discovered that 366 of the companies were allowed an average profit of 5.3 per cent and in 133 cases no profits were allowed or claimed. This was explained by the willingness of contractors to settle terminated contracts either without any claim at all, or without insisting on the costs or profits to which the Contract Termination Act would allow them who reasoned that greater profits would be caught by renegotiation or high taxes.

In 1944, the time required to settle War Department fixed price claims decreased from 5.2 months to 4.2 months. Terminated commitments settled in December, largely by the War and Navy Departments, were greater than in any previous months and totaled \$2,400,000,000, of which \$1,700,000,000 was for fixed price settlements and \$700,000,000 for cost-plus settlements. At the end of last year the termination loan pending settlement has decreased from its

peak of \$14,300,000,000 in October 1944, to \$11,600,000,000, a decrease of \$2,700,000,000 or 19 per cent.

Terminations totaled almost \$26,000,000,000 in canceled commitments through Dec. 31, 1944, of which 7 per cent were for fixed-price contracts. By year-end settlements of canceled commitments aggregated \$14,000,000,000 of which 86 per cent were for fixed-price contracts. The War Department accounted for 7 per cent of the terminations and 8 per cent of the settlements.

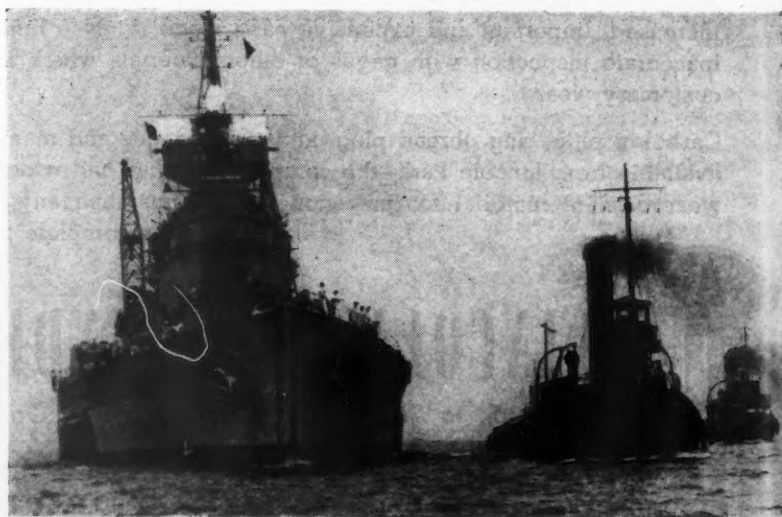
#### **Direct Settlements**

The report says that the War and Navy Departments and the Maritime Commission have carried further the experiments in direct settlements. A committee of industry has cooperated with a committee in the services in appraising the experiments now under way. The indications are that this work can be extended but also that the field of extension is comparatively limited. Within proper limits direct settlements, or "company wide settlements have been found to be useful in speeding settlements not only to the contractor affected but to all subcontractors under him. A regulation will be issued when discussions are completed.

#### **Subcontractors**

Mr. Hinckley calls this the most difficult and important single problem

**BRITISH FLAGSHIP: H.M.S. "Howe", now being assembled at Australian bases to operate in Pacific waters against Japan, recently arrived at Sydney. This flagship of Admiral Sir Bruce Fraser's British Pacific Fleet now carries the largest complement ever carried by a British battleship, 1860.**





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Tool life increases when tools and work are flooded with Sunoco. The outstanding cool-

ing and lubricating qualities of this cutting oil makes possible the prevention of overheating and drawing of the temper at the cutting edge and the reduction of "down time" for tool resharpening and resetting. Chips do not seize; the tools cut cleanly . . . evenly . . . at high surface speeds.

To speed production in your plant, get the details on Sunoco Emulsifying Cutting Oil . . . and to get worthwhile factual data on all types of machining operations, write for your copy of "Cutting and Grinding Facts" to . . .

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faced. The reason is said to be because subcontractors are more numerous than prime contractors, do not have the financial strength generally and consequently are the group which would be most seriously hurt by delay or unfairness in the settlement of contracts.

Speed in the settlement of the related prime contracts will help a great deal.

Suggested steps to solve the problems of subcontractors were:

1. Settlement of subcontracts prior to the settlement of the prime. (This is permitted by OCS Reg. 6 where claim is \$1000 or less.)
2. Primes should take advantage of the authority readily granted to settle as quickly as possible contracts under \$10,000. (At least 90 per cent of first tier subcontractors have claims for \$10,000 or less.)
3. Prime contractors should seek government financing of partial settlement of subcontract claims, establish a revolving fund so the prime does not have to make individual applications every time he wants to settle subcontractor claims.
4. Further training of termination personnel of both prime and subcontractors.
5. Services should put emphasis on making procedures uniform and vigorously exercise authority granted

to delegate authority to prime contractors to review subcontract settlements and make final settlements.

#### Pre-Termination Agreements

A campaign to secure informal written pre-termination agreements has been carried on most actively by the War Department. Such agreements have been made in 962 cases and many hundreds more are in process.

Matters covered by these informal understandings are: Accounting procedure and records; the amount of detail necessary in listing inventory, the types of material that can be scrapped upon termination, and provision for storage or removal of termination inventories and facilities.

The report says that the idea pre-termination arrangement is a formal binding agreement. Formal agreements can be reached in many industries whose production methods are such that a basis of fair compensation for termination can be arrived at beforehand. Prices are agreed upon at which the manufacturer will take over or sell all the different elements of the work-in process in the various stages of processing. The methods of arriving at administrative and other overhead expenses are agreed upon in advance. Upon termination,

all that is necessary is to take a physical inventory.

This inventory together with the previously agreed prices, determines the amount of the settlement. Thirty-five formal pre-term nation agreements have been reached by the War Departments and 377 are under negotiation.

Pre-termination planning should be carried out down the contractual channels. All the services, when they discuss pre-termination agreement with prime contractors are urging those contractors to discuss termination problems with their subcontractors.

The report says if such discussion is wisely carried out, it can aid production by reducing the worry and uncertainty in the minds of businessmen about termination.

#### Cold Pack Canner Quota Set at About 500,000 Units

Washington

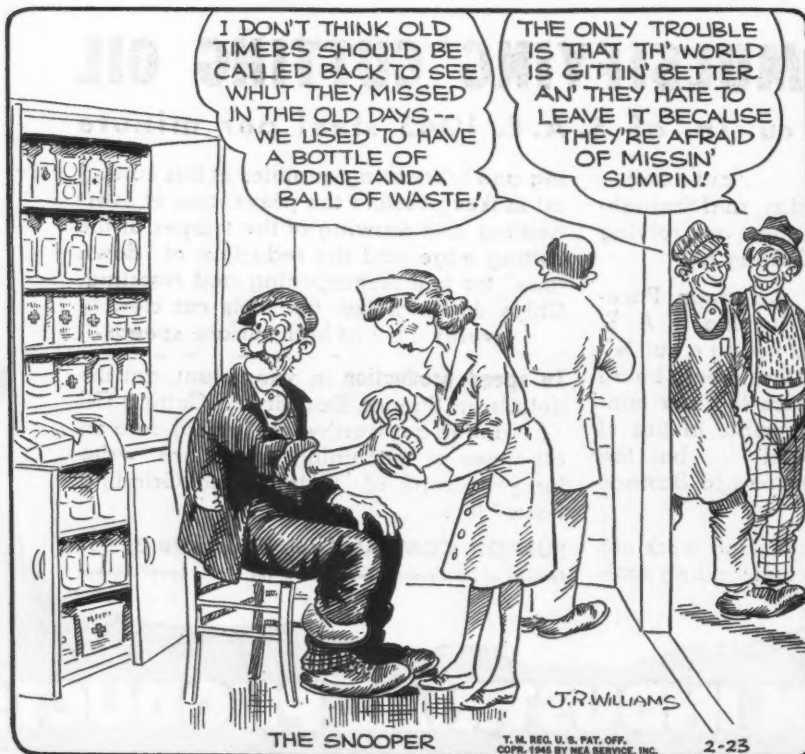
• • • Enameled ware manufacturers have been granted WPB permission to use sufficient iron and steel to make half as many cold pack (water bath) canners for the 1945 home canning season as they made in the year ended June 30, 1941, or about 500,000 enameled canners.

Direction 2 to L-30-b allows manufacturers to use this amount of iron and steel in addition to whatever part of their civilian quota, established in L-30-b as amended Nov. 14, 1944, they may wish to use to make canners. The iron and steel quota for civilian enameled ware is 70 per cent of base year usage. Under Direction 2, each manufacturer may make cold pack canners only in one size. Carbon steel may be used to make wire racks for canners produced under Direction 2.

If necessary to meet the approved program for 500,000 canners, WPB may authorize any manufacturer to exceed his quota and may assign quotas to manufacturers who have none. Any manufacturer who has additional facilities available for this purpose, WPB said, should file a letter with WPB, Washington 25, D. C., marked "Ref: L-30-b." The letter should specify the number of canners he wishes to make and the facilities he has for this purpose. Each application should be accompanied by an application (on Form CMP-4-b) for any additional steel needed and by Form WPB-3820 (standard manpower clearance form).

#### THE BULL OF THE WOODS

BY J. R. WILLIAMS



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INTERNAL

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of threading*



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Bryant Thread Gages completely eliminate tedious, time-consuming threading of gages into parts being inspected.

When inspecting internal parts, the segments are retracted by the control lever — the work is dropped over the segments — the control lever is released, and *immediately* engagement is made on *all the threads*. A *partial* turn of the work indicates overall accuracy within required tolerances, or accumulated inaccuracies of lead, taper, pitch diameter, thread form or the presence of burrs. External threads are inspected in the same manner, except that the segments are expanded to allow the part to be dropped inside.

The unique design of Bryant Thread Gages practically eliminates wear on the segments — it allows inexperienced help to inspect threaded parts four to five times faster than experienced inspectors using conventional gages — it eliminates the "feel" required in plug and ring gaging — it offers a method for complete, overall inspection of master plug and ring gages, and a method of transferring their accuracy to production threaded parts.

Write today for illustrated folder No. G2 which gives complete details.

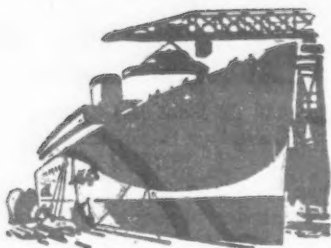
**BUILT IN 3 STANDARD  
MODELS**



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**SPRINGFIELD, VERMONT, U. S. A.**



• **K. T. Norris of Los Angeles heads Anti-East-Plus-Freight Committee of Western States Council . . . OPA labor office director anticipates \$1.10 per hr. average wage for city workers in the postwar period to maintain present farm income at peak.**



**S**ALT LAKE CITY—There was no dust to settle nor no wounds to heal after last week's gathering here of Pacific Coast and Intermountain delegates from independent heavy industry, with railroad men and hospitable Utah hopefuls for expanded and continued iron, steel and fabricated product production. Considering the variety of interests represented and sometimes conflicting primary selfish advantage, the conference steadily gained unity as it progressed, and on adjournment there was common understanding and acceptance of a single far-western objective; To work strenuously and with determination for a modification of the prewar Pacific Coast mill price differential and secure a new basing point on staple semi-finished steel products, f.o.b. West Coast ports on a basis of about half the former full intercoastal freight.

If a basing point is eventually established at Geneva, equal to eastern basing points, all future pressure will be on those railroads connecting Utah with Pacific port and industrial points. This move, moreover, would probably greatly encourage the establishment of fabricating and processing plants near the Geneva mill, if and when it becomes converted for the production of those normal and peacetime lines that are best adapted to its facilities and its potential market. On the other hand, if the eagerly and desperately

sought new basing point adjustment applies delivered on the Pacific Coast to those staple steel products that are or will in the future be produced in the Far West, then the various well-established smaller mill plants, and the two big new ones will have less umbrella protection than previously, and the burden of making such rate possible will be divided between mill management and the railroads. The incentive in both cases is bigger customers with greater volume, fabricating and processing a greater proportion of the manufactured products used west of the Rocky Mountains, and to even be enabled to extend their operations and sell their especially desirable or economically produced products beyond their hitherto restricted and comparatively thin market.

**C**HAIRMAN of the committee of 15 that was named at the close of the conference to confer with mill representatives and get down to figures and particulars is Kenneth T. Norris, president of the Norris Stamping Co., Los Angeles, and one of the most aggressive and determined of the newly matured West Coast manufacturers. His firm was among the first to successfully draw steel artillery shells. When sheet brass became more plentiful after the first famine, Army Ordnance progressively switched every contract but Norris', whose firm has continued throughout on steel.

Though now engaged 99 per cent on war ordnance work, Norris and his organization have definite and comprehensive postwar plans of magnitude and national significance. Everything depends, they say, on the differential they will have to pay in the postwar period in Los Angeles, compared with their potential competitors elsewhere. They say they don't insist on the same price, for they claim they will absorb a reasonable amount by ingenuity, lower production costs and keen management, but they argue they cannot continue to pay \$53 a ton for the same sheets that cost \$42 a ton at all eastern and midwestern points, especially if they should be actually made at Geneva or Fontana or Torrence from low-cost scrap or in new mills that claim they can operate as economically and produce steel as advantageously as any in the country. The day of reckoning with a sharp pencil seems to be fast approaching, so far as these western steel customers are concerned. "If all these new mills and the railroads that haul their raw materials and finished products propose to do is to meet water competition from the eastern seaboard, wherein are we better off and why should we buy steel made in the Far West or try to plan to operate anything but small jobbing and local supply shops?" they pertinently ask.

Other members of the crusading Anti-East-Plus-Freight Committee

**WESTERN STEEL COUNCIL:** Officials of Steel Committee discuss the future of the Geneva Steel Plant with executives of Geneva Steel Co., U. S. Steel subsidiary. Left to right: Peer D. Nielsen, general superintendent, Geneva Steel Co.; Dr. J. R. Mahoney, director of Bureau of Economic and Business Research, University of Utah; Gus P. Backman, secretary, Salt Lake City Chamber of Commerce and Member of Steel Committee; Leonard E. Read, general manager, Los Angeles Chamber of Commerce and chairman of Steel Committee; and Walther Mathesius, president, Geneva Steel Co.



# FOR *Increased* OUTPUT AT LOWER COST

**There is no substitute for Ex-Cell-O's wide experience in designing and building special machines!**

**YOU** have a substantial background of experience to draw from when you bring to Ex-Cell-O your problem in the precision machining of metal parts on a high production basis. The more economical production of accurate metal parts necessitates single-purpose machines of improved efficiency, capable of giving greater output and reducing unit cost. For years Ex-Cell-O has been an acknowledged leader in the field of special-purpose machines... precision machines with exclusive features that represent the utmost in accuracy, production, operating ease, rigidity, and durability. Every special machine made by Ex-Cell-O is designed to give the most practical results on the job for which it is built—improvement in work quality, direct savings in time and money, and maximum service in the machine itself.

This is why you should utilize Ex-Cell-O's experienced engineering and manufacturing facilities. Ex-Cell-O has representatives in all principal manufacturing centers. Consult the one nearest you, or write to Ex-Cell-O Head Office in Detroit.

**EX-CELL-O  
CORPORATION  
DETROIT 6, MICHIGAN**



*Increased production attained in precision machining this aircraft crankcase on Ex-Cell-O special-purpose machine.*

On this Ex-Cell-O special-purpose machine, aircraft crankcase sub-assembly of aluminum alloy is *precision* machined automatically except for loading and unloading. Part is loaded from top over center post to assure rigidity. "Start Cycle" button is pressed, and machine drills, reams, spot-faces and chamfers 16 stud holes in each of 14 deck pads (total of 224 holes, two operations per hole), then stops, ready for operator to unload and repeat the cycle.

This part was formerly machined one bank at a time. Now, with this Ex-Cell-O machine, handling and operation time is exactly one-half what it was; error between banks of holes, radially and vertically (due to reloading of part), is eliminated; also, by one machine only now being required for the job, floor space is saved.



*Ex-Cell-O precision four-way drilling and reaming machine with automatic seven-station index fixture.*



EX-CELL-O for PRECISION

If you do not now receive Ex-Cell-O TOOL TIPS, devoted to precision and speed in production, send your name, company, address and position to Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit 6.



EX-CELL-O makes Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Thread Grinding, Boring and Lapping Machines • Broaches and Broach Sharpening Machines • Hydraulic Power Units • Grinding Spindles • Drill Jig Bushings • Continental Cutting Tools • Tool Grinders • Fuel Injection Equipment • R. R. Pins and Bushings • Pure-Pak Paper Milk Bottle Machines • Aircraft and Miscellaneous Production Parts



are Alden E. Roach, president Consolidated Steel Co., Los Angeles; Charles E. Moore, president, Joshua Hendy Iron Works, Sunnyvale, Calif.; E. L. Soulé, Soulé Steel Co., San Francisco; Milo B. Spaich, American Forge Co., Berkeley, Calif.; William Schmitt, Schmitt Steel Co., Portland, Ore.; R. N. Allen, Star Iron & Steel Co., Tacoma, Wash.; Clyde Somerville, Seattle Steel Co., Seattle; John M. Wallace, president, Walker Bank & Trust Co., Salt Lake City; Gus P. Backman, secretary Chamber of Commerce, Salt Lake City; Charles Voigt, Stearns Rogers Mfg. Co., Denver; Clark D. Carpenter, Colorado School of Mines, Boulder, Colo. A member from Montana and a member at large are to be appointed. Leonard Read, executive manager of the Los Angeles Chamber of Commerce, is permanent secretary. Rather prompt and decisive action is pledged and expected.

\* \* \*

UTAH has a present population of some 500,000 and 225,000 of these are in Salt Lake City. Another 75,000 or so are in Ogden. Present worker shortage is agreed locally to be 25,000 for the state. The Navy has lately established what is said to be its largest supply depot near Ogden, where 100 warehouse buildings are already stocked with reserve stores for Pacific supply, and more are being constructed. The problem of recruiting workers for Geneva's mill and coal and ore mining has been and still is desperate. Presently 4000 are employed in the operation, and for post-war full capacity the requirements are put at 5800. Its present payroll is approximately \$8,000,000 annually, and Utah counts on postwar complementary and secondary industries to employ from 2500 to 3000 additional workers with additional payroll from \$6,500,000 to \$7,000,000 annually. Interest and confidence in the plant and its present management are remarkable throughout this state, and the ambition to continue its operation is in every heart and on every tongue.

Already the problem and cost of local taxes has arisen. In 1944 the Geneva Steel Co. paid the state \$472,829.30 in taxes, and valuation for assessment purposes now stands at some \$20,000,000. Postwar, to meet competition, these are fixed charges that might prove onerous. Present cost figures on operation do not cover interest on investment nor amortization, and so cannot be finally accepted

as indicative of final and long-run implications.

\* \* \*

While the independent and hard-pressed steel men were meeting at the Mormon-owned Hotel Utah, the state consumers' committee and state labor advisory committee were in session at the Hotel Newhouse, at the other end of broad Main Street. These latter were addressed by Warren E. Hall, Jr., OPA labor office director from Washington, who delivered himself in part as follows, as quoted by the local press:

"If the present standard of living is to be maintained in both rural and urban districts following the war, city workers will have to average \$1.10 per hr." Since city workers provide \$4 out of every \$5 income to farmers, Mr. Hall reasons that city workers wages must average \$2300 annually to hold prices stable and maintain farm income at its present peak."

This reasoning was of no comfort and solace to the local branch of one important national manufacturer whose warehouse crew had walked off the job a few days before because their wages were frozen at \$145 a month, or 87c. an hr., and no amount of persuasion by the management had prevailed on local officials of WLB to raise the ceiling. When the workers were assured that their only alternative would be to work in war plants from 25 to 40 miles from their established homes and families, they wearily and begrudgingly returned to their bins.

\* \* \*

Gus P. Backman, secretary of the local Chamber of Commerce was official host and behind-the-scenes manager and producer of last week's conference, and proved himself an exceptional provider of good will and harmony. His unusually effective and important organization, whose influence extends throughout the state, reflects his straight-from-the-shoulder and cards-on-the-table method of operation. Before he became secretary 12 years ago he was with the ZCMI, which is an alphabetical agency of major importance here. Zion's Co-operative Mercantile Institution is the great and sound merchandising operation owned by the Mormon Church, with wholesale departments in hardware, groceries, dry goods and general lines and with a principal department store and other retail establishments in Salt Lake and at other points. Starting as a traveler, when he covered the Intermountain area

from Dan to Beersheba, he advanced to the general managership of ZCMI and is locally respected for his business experience and attainment as well as for his frank and forthright personality and good faith. Labor representatives meet management weekly under Chamber auspices, and officials of the Chamber are in close working harmony and association with the Federal War Agencies, so that manpower figures and moves are here understood and approved by the business interests. President of the Chamber is Fred S. Tatlock, vice-president and general manager of the U. S. Smelting & Refining Co., and the immediate past president is the executive assistant and local chief official of Union Pacific.

\* \* \*

Consolidated Vultee Aircraft Corp. at San Diego announces an additional \$40,000,000 contract for Privateer PB4Y-2 Navy bombers which have been in production for over a year. The new contract carries production well into 1946, since previous contracts will not be completed until late this year.

\* \* \*

Consolidated Steel Corp. at Los Angeles has received an additional \$58,000,000 contract for ten cargo ships and six refrigerated cargo vessels. O'Keefe & Merritt Co. at the same place will furnish \$7,000,000 worth of diesel-driven generator sets for the Signal Corps.

\* \* \*

At Tacoma Todd Pacific Shipyards are engaged in the experimental construction of a new type destroyer escort tender displacing 8,000 tons which vessels will soon be built in quantity according to Rear Admiral A. L. Cochrane, chief of the Bureau of Ships from Washington when he was in the Pacific Northwest recently. The production program contemplated would occupy the Todd yard at full speed for 18 to 20 months and would require 5000 additional workers.

\* \* \*

Puget Sound Bridge and Dredging Co. at Seattle is building 260-foot steel barracks ships for the Navy to be used in war zones for the relief housing of submarine crews and other personnel and to substitute for the building of shore barracks.

\* \* \*

Shofner Iron & Steel Works at Portland has secured WPB approval for construction of a \$100,000 addition to its foundry plant.



# MULTIPRESS

**A 4-TON "POWERHOUSE"  
IN SPACE-SAVING  
BENCH SIZE!**



Basic Unit  
**\$575.00**

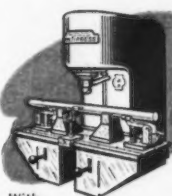
Patents Applied For

MULTIPRESS is the answer to an amazing range of production needs in one compact, space-saving unit! For example, it gives you:

- Ram pressures from 300 to 8,000 pounds . . . and you can closely limit them anywhere in that range!
- Length of ram stroke easily adjustable from  $\frac{1}{16}$ -inch to six inches!
- Ram speeds up to 200 inches per minute downward, and 300 inches per minute upward.
- Full "feather-touch" control of ram travel and pressure at all times—plus many other controls.
- A completely self-contained, motor-driven, oil-hydraulic machine tool! Easily portable. Delivered ready to connect and operate, after installation of a motor-starter.
- Built for a wide range of standard accessories that further broaden the applications of the basic Multipress.

MULTIPRESS is 16 inches wide, 26 inches deep, and 34 inches high, weighs only 725 pounds, and has a table area of  $10\frac{1}{2} \times 16$  inches, which can be increased to  $10\frac{1}{2} \times 32$  inches with table extensions.

The ram responds instantly to the slightest movement of the control levers—may be lowered rapidly or slowly, or stopped anywhere in its downward travel while the work is positioned beneath it. Pressures can be increased gradually or applied in full at once. The gauge shows pressures exerted on the ram in both tons and pounds per square inch.



With  
Straightening Fixtures

Multipress fixtures are available for efficient, high-precision straightening. Matching benches, table extensions, side shelves, a variety of bolster plates, and special ram action controls are also among the standard Multipress accessories. The Denison Engineering Co., 1158 Dublin Road, Columbus 16, Ohio.

**Write for This Free Booklet on  
MULTIPRESS**

This 12-page book gives you full details on Multipress, its operation, and accessories. Let us send you a copy!

Industry's

Right Hand

**DENISON**  
EQUIPMENT *in* APPLIED  
*Hydraulics*



**ALBERT W. NELSON**, assistant manager of sales, New England district, American Steel & Wire Co.

- **Albert W. Nelson** has been appointed assistant manager of sales for New England district of American Steel & Wire Co., Boston. Mr. Nelson has been associated with the company in the sales department since 1939.

- **Arthur B. Sonneborn** has been appointed district manager in charge of Michigan-Ohio sales and service, National Electric Welding Machine Co., Bay City, Mich.

- **J. Raymond Smith** has been appointed to the newly-created position of assistant to the general sales manager, Rustless Iron & Steel Corp., Baltimore. Mr. Smith formerly was manager of stainless steel sheet sales.

**J. RAYMOND SMITH**, assistant to the general sales manager, Rustless Iron & Steel Corp.



## PERSONALS

- **William H. Colvin, Jr.**, has been elected president of the Crucible Steel Co. of America, New York, succeeding **Joseph H. Callan**, who resigned to become chairman of the company's executive committee. Until his recent election, Mr. Colvin was for nine years president of Rotary Electric Steel Co.

- **Murray B. Wilson**, former New York district sales manager, The American Rolling Mill Co., Middletown, Ohio, has been appointed district sales manager of Armco's Dayton district. Mr. Wilson replaces **Edson D. Dronberger**. **W. B. Quail**, former New York district manager of Armco Railroad Sales Co., succeeds Mr. Wilson.

- **Ralph J. Cordiner** has been elected vice-president and assistant to the president of the General Electric Co., Schenectady. During his many years association with the company Mr. Cordiner has served in a managerial capacity in the Appliance and Merchandise Department and Radio Division. For the past 18 months he has been assistant to the president.

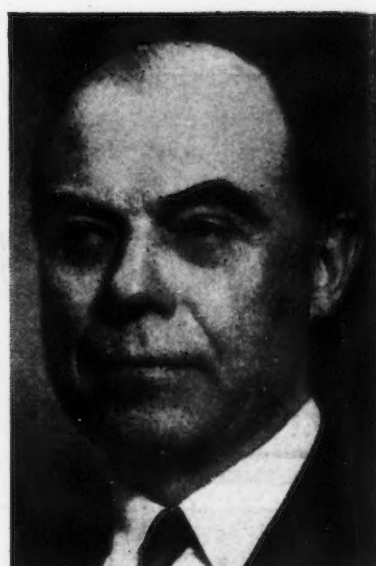
- **J. B. Graham** has become assistant to vice-president, sales, National Tube Co., Pittsburgh, a U. S. Steel Corp. subsidiary. **W. J. McKee** has been appointed central area sales manager and **W. T. Miller**, assistant to general manager of sales. Mr. Graham and Mr. McKee have been assistant general managers of sales since 1936. Mr. Miller has held various sales positions in the organization since 1907.

- **Noel J. Poux** has been appointed manager of the Experimental Engineering Division, as well as manager of the Works Engineering Department, Talon, Inc., Meadville, Pa.

- **S. B. Heppenstall**, since 1917 the vice-president in charge of engineering, Heppenstall Co., Pittsburgh, has been elected chairman of the board of directors.

- **Richard J. Flickinger** has been appointed purchasing agent for Kennametal, Inc., Latrobe, Pa.

- **Philip E. Furlong** has retired as head of the Texrope Division, Allis-Chalmers Mfg. Co., Milwaukee, after 50 years of service with the firm.



**ERNEST P. SCHROEDER**, manager, Foreign Engineering Department, Westinghouse Electric & Mfg. Co.

- **Ernest P. Schroeder** has been appointed manager of the Foreign Engineering Department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and **John T. Mathews** has been named assistant manager. Mr. Schroeder, who joined Westinghouse in 1917, will retain his duties as resident representative of the Westinghouse Electric International Co. He succeeds **D. I. Vinogradoff**, who was transferred to the International company on special assignment.

- **Ben Ashton**, former vice-president and chief engineer, Electrol, Inc., Kingston, N. Y., has been elected president to succeed **Ray Criddle**, resigned. Mr. Ashton joined the company in 1940.

**BEN ASHTON**, president, Electrol, Inc.





## another **VICTORY TECHNIQUE**

*Magnaflux\* Inspection of Aviation Engine Crankshaft. Magnetic particles are flowed over part to be inspected and electric current applied. Particles collecting in patterns unfailingly disclose flaws or faults.*

## **MAGNETIC TATTLE-TALE PROVES METAL FRIEND OR FOE**

Uncle Sam's fighting men have proved themselves invincible before any known adversary. But hidden foes could wreak terrible havoc. Should equipment fail in a crucial moment, personal bravery might mean only personal sacrifice.

To guard against this possibility, Uncle Sam's Army and Navy Air Services absolutely require that all highly stressed magnetizable parts in aircraft and aircraft engines be subjected to Magnaflux\* inspection. Thus friend is proved before foe can harm.

In addition, Magnaflux\* is widely used for the inspection of welds in gun mounts, pressure piping on shipboard and in power plants, for the inspection of heat treated parts, projectiles, and on railroads and in automotive manufacturing fields.

Magnaflux\* is only one of the many techniques that are insuring victory by assuring the best and greatest production the world has imagined.

Such Victory Techniques in metallurgy and in all phases of production can be vital to you in peace-

time operation if a competitive position is to be achieved. *You must be alert to learn them.* And your Lindberg representative is eager to do his share to help you. Ask him about the new developments in brazing and in powder metallurgy with the new Lindberg furnaces; in the treatment of metals by heat in any form.

**LINDBERG ENGINEERING COMPANY**  
2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

**Lindberg**  
**FURNACES**

**SUPER-CYCLONE** for hardening, normalizing, annealing, tempering

**CYCLONE** for accurate, low-cost tempering and nitriding  
**HYDRYZING** for scale-free and decarb-free hardening

\*Trade-Mark registered by Magnaflux Corporation





**JAMES J. MALONE**, assistant general manager, United Platers, Inc.

• **James J. Malone**, who has served United Platers, Inc., Detroit, in various capacities for the past ten years, has been advanced to the post of assistant general manager. Prior to the war Mr. Malone had charge of the sales division; **Edward W. Tawyea** has been promoted from superintendent to general superintendent; **George D. Blair** has been made manager of the sales division and **W. Meyer** has been appointed comptroller.

• **William Rodgers**, formerly chief metallurgist of the Cleveland district of Republic Steel Corp., has been appointed assistant superintendent of the 98-in. strip mill and **T. M. Chapman** has been named chief metallurgist succeeding Mr. Rodgers.

• **C. E. H. Palmer**, manager of the New Haven office, General Electric Co., Schenectady, since 1939, has been made district manager of the apparatus department, with headquarters in Boston. Mr. Palmer succeeds **T. S. Knight**, who as commercial vice-president has become a member of the president's staff.

• **Col. O. K. Graef**, recently retired from the Army to an inactive duty status, has resumed his former association with the Bearings Division of **Joseph T. Ryerson & Son, Inc.**, Chicago. Col. Graef will have charge of West Coast sales of **Ryertex** non-metallic bearings and **Glyco** babbitt metals, with headquarters at Los Angeles.

• **Eric Hall** has been appointed New Jersey division manager, **Westinghouse Electric Supply Co.**, New York.

• **T. W. Pettus** has been elected president of the National Bearing Division, **American Brake Shoe Co.**, New York. Mr. Pettus formerly was executive vice-president of the **National Bearing Metals Corp.**, until recently a subsidiary of the parent company.

• **Walter J. Riley** has been elected vice-president of **Industrial Metal Fabricators, Inc.**, Detroit.

• **Henry T. Chandler**, formerly assistant to president, has been elected a vice-president of the **Vanadium Corp. of America**, New York. **Benton H. Grant**, formerly assistant to president, has been appointed an assistant vice-president.

• **Robert Santini**, associated with **Sciaky Brothers**, Chicago, for the past 12 years, has been appointed district manager of the New York office.

• **U. E. Sandelin** has been appointed manager of the Seattle district office, **Allis-Chalmers Mfg. Co.**, Milwaukee, succeeding **A. J. Schmitz**, who has been named Pacific regional manager. Mr. Sandelin will also supervise the Spokane branch office. Prior to his recent appointment, Mr. Sandelin was attached to the district office in Washington, D. C., for three and one half years.

• **Harry F. Davis**, for the past five years manager of sales, **Monarch Aluminum Mfg. Co.**, has joined the **Accurate Die Casting Co.**, Cleveland, in the capacity of manager of sales and field engineer.

• **Harold N. Blount**, formerly of **Curtiss-Wright Corp.**, has joined the staff of the **Buffalo Bolt Co.**, North Tonawanda, N. Y., and will have charge of market and product research.

• **Arthur R. C. Markl** has been appointed chief research engineer, **Tube Turns**, Louisville, Ky. Mr. Markl was previously associated with the **M. W. Kellogg Co.**, New York.

• **Gwilym A. Price**, of Pittsburgh, and **John R. Read**, of Hamilton, Ontario, Canada, have been elected to the board of directors, **Westinghouse Electric & Mfg. Co.**, East Pittsburgh, Pa.

• **H. A. Brassert**, for the past 10 years chief engineer of the **Youngstown Sheet & Tube Co.**, has joined **H. A. Brassert & Co.**, Pittsburgh.



**RAYMOND D. DWYER**, superintendent of the steel production department, Gary works, Carnegie-Illinois Steel Corp.

• **Raymond D. Dwyer** has been appointed superintendent of the steel production department, Gary works, **Carnegie-Illinois Steel Corp.**, Pittsburgh. **Jacob C. Wilkins** has been named superintendent of central mills. Mr. Dwyer has been associated with the plant since 1912 and since September, 1943, has served as assistant superintendent of steel production. Mr. Wilkins, who has been with the organization since 1910, served as superintendent of the billet and 44 in. blooming mills prior to his recent appointment.

## OBITUARY...

• **Christopher F. Coda**, president of **Jenks & Muir Mfg. Corp.**, Detroit, and former vice-president of **Murray Corp. of America**, died recently.

• **Huntington Downer**, 57, sales manager of **Basic Refractories, Inc.**, Cleveland, died Feb. 11.

• **William F. Krenzke**, 59, chief engineer for the **Jacobsen Mfg. Co.**, Racine, Wis., died suddenly January 23.

• **Albert F. Funk**, treasurer of the **LaCrosse Trailer & Equipment Co.**, LaCrosse, Wis., and head of the **LaCrosse Rubber Mills Co.**, died February 4.

• **Alfred C. Marshall**, director, consultant and chairman of the operating council, **The Detroit Edison Co.**, Detroit, died February 9.

## RECONVERSION PROBLEM SOLVED!

### American H-2-30 STANDARD BROACHING MACHINE ADAPTED TO MANY "SPECIAL" JOBS!

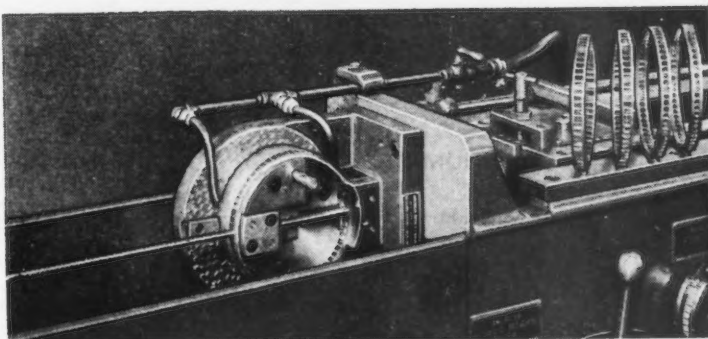
This standard *American* broaching machine, designed for use in many types of war production, is cheaply and quickly converted to peacetime manufacture. Considerably less expensive than especially built equipment, it will perform a large number of "special" jobs accurately and economically.

The set-up for one such job is illustrated at the right: To broach rectangular holes in aircraft bearing cages. Two opposite holes are broached at each pass. Starting with a drilled hole, three passes, each with a slightly larger broach, are required for each hole. Exceptional finish at a high production rate is assured.

*American's* complete broaching service—machines, tools, and engineering—is available to speed your production. Let *American* engineers help solve your precision manufacturing problems with standard machinery that will save you valuable time and money. Write for further details.



ABOVE: Standard American H-2-30 Horizontal Broaching Machine reconverts easily from war to post-war production.



Close-up view of set-up described at left, showing bearing cages in various stages of completion.



Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.

MEMBER  
**BROACHING TOOL  
INSTITUTE**

# American

## BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN  
BROACHING MACHINES  
PRESSES  
BROACHING TOOLS  
SPECIAL MACHINERY





# Dear Editor:

## METAL ADHESIVE

Sir:

We have been advised of an inquiry addressed to you on Redux adhesive. Redux was developed by the Aero Research Co. in England and we are producing a similar product in this country. We should be glad to answer inquiries from readers asking for information on Redux.

ROBERT P. GOODALE  
Resinous Products & Chemical Co.,  
Washington Sq., Philadelphia 5

● This product was discussed in "The Joining of Metal," July 13, 1944, and "The Strength of Glued Sheet Metal," Aug. 24, 1944.—Ed.

## WHEEL DRESSER

Sir:

We would like information on a radius dresser for grinding wheels. Can you advise us who handles one called the "Copy-Kat?"

STEPHEN W. NEDELA  
C. & M. Tool Co.,  
6317 1/2 E. Atherton Rd.,  
Flint 7, Mich.

● This radius dresser is unknown to us, but during the last year or two several other types have been described under the heading of "New Equipment" and their names will be forwarded.—Ed.

## HEAT TREATING ALUMINUM

Sir:

We wish to get information on the heat treatment of aluminum alloys. Have you published anything recently on the subject?

JAMES T. DUNN  
W. J. Dunn Co.,  
455 C St., Boston 10

● Yes we have published "Speeding Heat Treatment of Aluminum Alloys," Mar. 9, 1944; "Continuous Heat Treatment of Aluminum," June 22, 1944; "Development of High Yield Strength in Clad 24S Aluminum Alloy," Feb. 17, 1944; "Cold Water Spray Quench for Clad Aluminum Alloy," Feb. 17, 1944; and "Heat Treatment and Aging of 24S Aluminum Alloys," Jan. 27, 1944.—Ed.

## IMMERSION PYROMETER

Sir:

We should like additional information on the Schofield-Grace quick immersion pyrometer mentioned in the April 20, 1944 issue, page 75. Is this pyrometer on the market today?

BERT R. LANKER,  
Metallurgist  
Farrell-Cheek Steel Co.,  
Sandusky, Ohio

● This is a British instrument which is not being marketed in this country. However, a direct immersion platinum thermocouple has been developed by L. F. Weitzenkorn and G. C. Klingel, metallurgical engineers at Rustless Iron & Steel Corp., Baltimore. This thermocouple is hooked up with a pyrometer made by the Brown Instrument Co., Philadelphia.—Ed.

## PRECISION CASTINGS

Sir:

Your articles on the equipment and

materials for precision casting were indeed excellent. I would greatly appreciate four reprints if available.

C. T. EVANS, JR.,  
Metallurgical Engineer  
Universal Cyclops Steel Corp.,  
Titusville, Pa.

● Copies have been forwarded.—Ed.

## TREATING IRON ORE

Sir:

I am advised that you have published articles on the use of natural gas in making pig iron. How can I get information relating to the treatment of iron ores with natural gas?

SIDNEY M. WEIL  
810 First National Bank Bldg.,  
Albuquerque, N. M.

● You may have reference to processes devised for low temperature treatment of iron ore for conversion into sponge iron using gas as fuel. Many ideas have been proposed but very little production has resulted. Probably the best source of information is the Bureau of Mines, Washington, D. C., which has been greatly interested in this subject and distributes some publications on the processes.—Ed.

## INDUSTRIAL RADIOGRAPHY

Sir:

I am very interested in learning which are the best books about X-rays and their use for analysis and study of metals and metallic structures.

LT. COL. FERNANDO G. CAMINO,  
Military Attaché  
Spanish Embassy,  
Washington, D. C.

● One of the best works on this subject is "Industrial Radiography," by Ancel St. Johns and Herbert Isenburger, published by John Wiley & Sons, Inc., N. Y. If you want to study the use of radium for this purpose "Radium for Industrial Radiography" by Geselius and Briggs, published by Radon Co., Inc., 1 East 42nd St., New York, is recommended.—Ed.

## EARLY BLAST FURNACE

Sir:

Doing research work on the history of the casting industry, I have had my attention called to an article in your July, 1926 issue, having to do with a blast furnace, probably the first in the U. S. I would appreciate having a copy of this article if possible, together with accompanying photographs. Any assistance on the history of the casting industry will be welcome.

B. L. SIMPSON,  
President  
National Engineering Co.,  
549 W. Washington Blvd., Chicago 6

● We are attaching a copy of the short article that appeared in the July 8, 1926, issue, dealing with the first blast furnace in the U. S. located at Pawling, W. Va. There were no photographs with the article. We would suggest that you look up "Iron in All Ages," by James M. Swank, 1892, at your library. This is a good treatment of this subject up to that date.—Ed.

## SURFACE FINISH

Sir:

I should like to receive the 3-part article on "Measuring and Designating Surface Finish," by James A. Broadston of North American Aviation, Inc., which appeared in the issues of Oct. 19, 26 and Nov. 2, 1944.

P. H. DANLY,  
President  
Danly Machine Specialties, Inc.,  
Chicago 50

Sir:

Kindly send me two sets of tear sheets of the Broadston article.

G. R. CASKEY,  
Metallurgical Engineer  
Bliss & Laughlin, Inc.,  
Harvey, Ill.

● Tear sheets mailed.—Ed.

## CLAD METAL CREDIT

Sir:

We note in the article "Clad Metal Bullet Jacket Program Revived in War Production Board Hearings" by T. E. Lloyd (Jan. 11, p. 87), that the name of our company seems to have been omitted in the cup and jacket manufacturers. We filled a fair sized direct contract of bullet jacket cups from gilding metal clad strips.

J. R. GRIFFIN  
Griffin Mfg. Co.,  
Erie, Pa.

● A regrettable oversight. Sorry.—Ed.

## ISOTHERMAL DIAGRAMS

Sir:

Where can literature be obtained on isothermal transformation diagrams?

C. D. MALLOCH,  
Industrial Electric Heating Engr.  
Gas & Electricity Consumers Power Co.,  
Jackson, Mich.

● A very good interpretation is contained in the "Atlas of Isothermal Transformation Diagrams" published by the U. S. Steel Corp., 71 Broadway, N. Y. A copy is going forward under separate cover.—Ed.

## STEEL USES AND TREATMENT

Sir:

Can you recommend books containing information on types of steel with particular reference to analysis, heat treatment and general usage?

ERNEST NORRMAN,  
Secretary, Rockford Chapter No. 12  
American Society of Tool Engineers,  
Rockford, Ill.

● While we have published many articles in this field, full coverage of the subject is contained in the book "Engineering Alloys," published by the American Society for Metals, Cleveland.—Ed.

## TESTING CASTINGS

Sir:

I would appreciate receiving a reprint of "Testing Wall Thickness of Intricate Castings," published in THE IRON AGE, Sept. 30, 1943.

JOHN W. JUPPENLATZ,  
Chief Metallurgist  
Lebanon Steel Foundry,  
Lebanon, Pa.

● Tear sheets mailed.—Ed.





# 7 LEAGUE BOOTS

FOR METAL CLEANING PRODUCTION

WHEELABRATOR will give you "7 League Boots" for metal cleaning production, enabling you to take long, swift strides forward; out-distancing competition to give your customers better finished, cleaner castings . . . quicker! Let's let a few satisfied users report on the basic considerations:

TIME: "5 hours former cleaning time reduced to 15 minutes."

PRODUCTION: "Provided 60% more cleaning capacity over former sandblasting equipment."

COSTS: "Saving over 2% per cwt."

LABOR: "Reduced direct labor cost 50%."

SPACE: "Replaced 8 tumbling mills with one Wheelabrator and increased production tonnages by 40%."

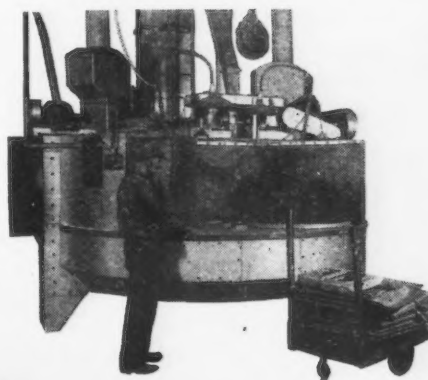
These reports from our files are not exceptions but rather average statements. Such evidence from over 2000 users proves that the Airless Wheelabrator will give you a change of pace over outmoded cleaning methods.

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**AIRLESS BLAST**  
**CLEANING**

# This Industrial Week . .

- **Steel Order Volume Declines Slightly, but Drop Is Not Significant**
- **Directive Situation Gets Steadily Worse with Reappraisal Necessary**
- **Steel Ingot Rate Again Expands Reaching 95 Per Cent of Capacity**

**A**LTHOUGH steel order volume through the first half of February appears to be from 20 to 30 per cent less than in the corresponding January period, such statistics are far from significant in appraising the apparent hectic condition in the steel delivery situation. Furthermore, such a decline even if continued at the same rate will have little or no effect upon already over-extended deliveries.

Much of the order volume in recent weeks has been far beyond the steel industry's capacity to produce, and the War Production Board this past week found on its hands requirements for more than 140,000 tons of sheets which it cannot schedule for several months even with the aid of directives. As a further indication as to what the accelerated war picture had done to the steel industry, tens of thousands of tons of new sheet business has been turned away in the past week.

With some producers delivery schedules have become so extended as to be almost meaningless. Drum sheet schedules are filled through to the end of this year, while most producers can give no closer promises than December for galvanized sheets. Carbon bars have become so tight that November deliveries are being promised. Because of this situation, which is similar for many other steel products, some steel sources believe it to be extremely doubtful that orders for those products, which are so far extended, will ever be completed, especially if the war in Europe should suddenly end.

The directive situation whereby the WPB attempts to get prior delivery on urgent war material over the routine allotment of regular war steel business, is becoming more chaotic. One company indicated that last November carbon bar schedules were closed through February. Since that time directives have been issued for February delivery which accounted for about a quarter of the company's capacity.

While the present order and delivery situation represents one of the tightest, if not the tightest, periods since the war began, the danger of a complete breakdown of the present method of scheduling steel orders may not be as close as some sources believe. Undoubtedly the fact that many plans and projects were cut back last fall when victory in Europe was expected, has caused a far larger safety factor in the form of inflated war demands than eventual needs will probably prove necessary. Nevertheless such action must be taken since it is the price to be paid for a war of such gigantic proportions. The orders now on the books, even though they may in part turn out later to be unnecessary, do, today, represent realities.

The combination of a tremendous order volume, increased backlogs and substantial carryovers will in themselves probably cause, within the near future, a complete reappraisal of the steel demand situation. The return of several experienced steel men to WPB's Steel Division augurs well for such an overhauling. The belief is already strong, as it was on one other occasion when the same situation prevailed, that the steel

industry, no matter how many directives are issued, can only produce to its capacity and can only take the first things first.

**T**HE shell steel production directive is expected to be boosted again in March and the increase in tonnage will be considerable. The significance of such an expansion will make it more difficult to honor allotment tickets for rails, semi-finished steel and structural products.

Recently the domestic steel market may have had a glimmer of what to expect from foreign steel competition. American mills, in at least one instance, have tasted British competition in sales to the Canadian railroad equipment industry. One such order, a substantial one, originally placed with an American mill, was cancelled last week because of better delivery promised by England.

The United States Army locomotive program for 1945, including 500 Russian and 700 French locomotives, has been authorized for construction beginning in June. Realignment of figures published last week finds American Locomotive and Baldwin Locomotive each building 260 and Lima Locomotive 180 locomotives for France. The Lima distribution had been incorrectly ascribed to the Russians. Baldwin, it is reported, will sublet about half of the locomotive tenders to Greenville Steel Car Co., Baldwin and American each will build 250 locomotives for the Russians.

Lima Locomotive has received an order for 10 2-8-4 type freight locomotives with 21,000 gal. tenders. The Chicago Rapid Transit has awarded Pullman Standard and the St. Louis Car Co. two units each consisting of three-car articulated trains for the elevated lines. Belgium is reported to be inquiring for 300 steam locomotives and Czechoslovakia for 150, but these queries are believed to be still in a nebulous stage. Colorado and Wyoming Railway has placed 50 mill type gondolas with Mt. Vernon Car.

Poland has applied to lend-lease for 25,000 large capacity trucks to help solve transportation problems there. Chances of obtaining these are not considered good in light of present over-heavy demands on the domestic truck industry for both military and essential civilian use.

Steel ingot production this week regained two points to 95 per cent of rated capacity. District gains occurred in Pittsburgh, up five points to 92 per cent; Youngstown, up two and a half points to 88.5 per cent from last week's revised rate of 86 per cent; Philadelphia, up one and a half to 97 per cent; Cleveland, up five points to 96 per cent from a revised operating rate of 91 per cent. Output in Cincinnati dropped five and a half points to 94.5 per cent, and in the West production declined two points to 88.5 per cent. Chicago at 100 per cent; Buffalo at 104.5 per cent; Wheeling at 90; Southern at 97; Detroit at 97.5; St. Louis at 94.5, and the Eastern District at 95 per cent continued unchanged.

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INGOTS, MILLION NET TONS

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• **STEEL UNION CONTRACT**—The speed with which the new contract between the U. S. Steel Corp.'s steelmaking subsidiaries and the United Steel Workers of America was completed augurs well for future management-union relations. Despite the usual forensic display between steel companies and the union before they got down to brass tacks in conference, the latest setup by comparison with previous ones constitutes a definite milestone in progressive industrial relations. It probably also marks the end of one union error—that of becoming recognized and being accepted as an equal not only in words but in actions. The next phase which Mr. Murray and his steel union is probably entering and which will present its own new set of problems for union officials is that of statesmanship, satisfying the rank and file without jeopardizing labor's newly won gains. Probably the greatest innovation in the new contract is the mutual agreement to speed up disposition of grievances by the formation of a "Board of Conciliation and Arbitration," three members, one chosen by the union, one by the company and one by mutual consent, the latter to be chairman, to hear unsettled cases. Its decision is final. The bulk of the contract included the recent War Labor Board Directive.

• **PLANT TO CLOSE**—The Carbondale, Pa., plant of the American Welding Co., subsidiary of American Car & Foundry Co., will be closed down April 30 and all equipment will be disposed of with the plant itself placed on the market for sale. It was originally built to produce force-welded tank car tanks, forge-welded containers and Morison furnaces. Market possibilities for such manufacturing were said to be no justification for maintaining the Carbondale plant.

• **COMMON LABOR**—The local War Manpower Commission of Pittsburgh has found it necessary to return Pittsburgh steel plants to the "must" list. The greatest need is now said to be for common labor, a class that no longer seems to exist. This type of worker is a dire necessity in the steel industry for use in repairing open hearth furnaces and blast furnaces as well as other unskilled duties such as loading and unloading freight cars of raw materials. The ability of most workers to become semi-skilled or skilled workmen in name at least after having been on such vocations for a very short time has practically dried up the supply of so-called common labor, which in the steel industry receives the best wage rate.

• **STEEL COMPANY EXPENDITURES**—Steel companies will have spent by the end of 1945 a total of more

than \$1,310,000,000 of their own funds to expand and modernize their plants and properties since the beginning of the war. Government money spent for steel expansion during the war reached \$1,095,000,000.

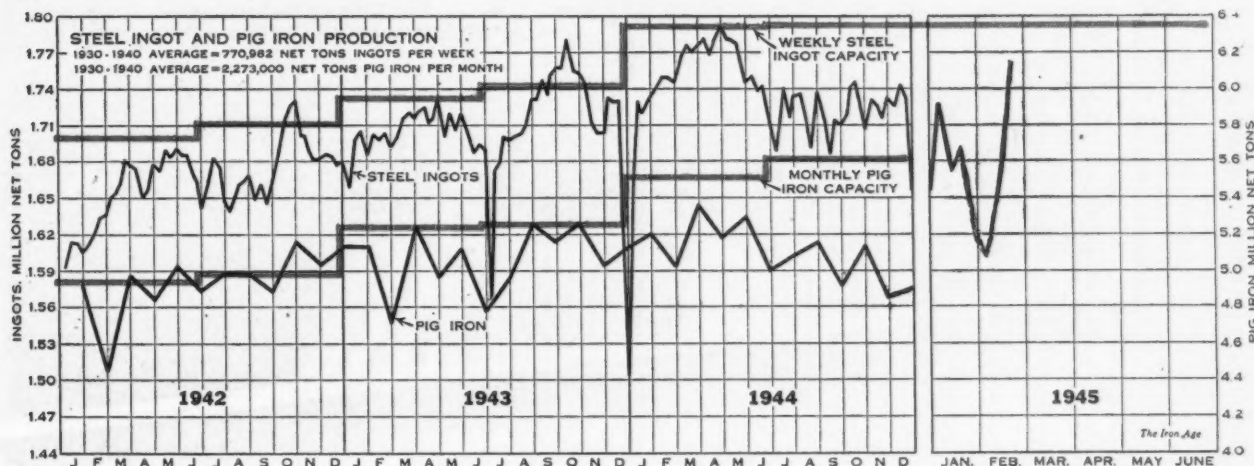
• **CONSTRUCTION VOLUME**—Nonresidential construction in the 37 eastern states, measured by contracts awarded during January, amounted to \$81,614,000 as compared with a total of \$67,908,000 during January of last year, according to F. W. Dodge Corp. Residential construction declined from a total of \$40,997,000 in January, 1944, to \$19,536,000 in January, 1945. Total construction volume during the first month of 1944 aggregated \$159,238,000 as compared with \$140,949,000 in January, 1945.

• **OIL INDUSTRY FACES HURDLES**—The prospects of the oil industry hitting its goal of 27,000 new wells during 1945 appears to be highly improbable, mainly because producers are expected to be unable to obtain sufficient pipe and tubing. This goal is about 3000 wells from 1944 and about 9000 from 1943 achievements. Even though the industry does not achieve its goal, there will not necessarily result a shortage of crudes that will seriously affect present supplies of oil country products. However, since the goal was set, the heavy demand for tubular products in war items has made it practically impossible to supply the demands for oil country tubular items.

• **U. S. STEEL SHIPMENTS**—Shipments of finished steel products by subsidiary companies of U. S. Steel Corp. for the month of January, 1945, were 1,569,115 net tons. This compares with 1,767,600 net tons in December, 1944, a decrease of 198,485 net tons, and with 1,730,787 net tons in January, 1944, a decrease of 161,672 net tons.

• **MORE SHELL FORGINGS**—Approval has been granted for the expenditure by the Spang-Chalfant Division of National Supply Co., Pittsburgh, of about \$1,000,000 for the rehabilitation and installation of equipment at the Washington Tinplate Co. plant, Washington, Pa., for the production of 105 mm. shell forgings. The rehabilitation and equipment installation will be under the direction of the Baltimore office of the U. S. Engineers, but the completed plant will be operated by the National Supply Co.'s Spang-Chalfant Division. Production is expected to get under way some time in June, and about 500 people will be employed.

## The Iron Age



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 13	87.0	100.0	86.0*	95.5	91.0*	104.5	90.0	97.0	97.5	90.5	101.5	94.5	95.0	93.0
February 20	92.0	100.0	88.5	97.0	96.0	104.5	90.0	97.0	97.5	88.5	94.5	94.5	95.0	95.0

\* Revised



# MESTA BAR MILLS



At the Chicago District's new electric steel plant . . . a Mesta 36" Roughing Mill for supplying billets to the 32" Bar Mill. The Leader, Intermediate and Finishing Stand of this mill are shown below.



**ROLLS AND STEEL MILL EQUIPMENT  
HEAVY DUTY MACHINE TOOLS  
FORGINGS**

**BUY EXTRA  
WAR BONDS**

**MESTA MACHINE COMPANY • PITTSBURGH, PA.**

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## U. S. Steel-WSWA Contract Is Handled Speedily with Many Innovations

By T. E. LLOYD

### Pittsburgh

• • • Setting the pattern for all union agreements between the United Steel Workers of America and steel producers, the union and the U. S. Steel Corp. reached an agreement on Feb. 15, and signed a new union contract, the term of which has not yet been decided. The formulation of this new contract set a new record in speedy handling of steel company-union agreements. While the backwash of the fight between the union and the steel industry dates back two years, it was only on Jan. 4, 1945, that actual negotiations on the new contract were started in Pittsburgh.

The U. S. Steel Corp. and the USWA-CIO reached agreement on all except one point, which concerns the length of term of the contract. The union urges a fixed term running until the Fall of 1946, but the company maintains the position that the termination clause should be the same as in prior agreements, subject to re-opening by either party at any time. The War Labor Board has scheduled a hearing on the term of the contract for Friday, Feb. 23.

Mainly, the new contract incorporates the Nov. 26, 1944, Directives of the War Labor Board. In brief, they are as follows:

1. A 4c. premium for afternoon shift and a 6c. premium for night shift work.

2. One week's vacation for one year service and two week's for service beyond five years.

3. Creation of a commission (not to be confused with the Board of Arbitration) to see that certain principles are observed in the settlement of wage rate inequalities, among which is observance of a limitation that there shall be no "across-the-board" wage increases and that the total amount shall not exceed 5c. per hr., per employee.

4. Six holidays with time-and-one-half for all hours worked.

5. Dismissal or severance pay. The contract contains the WLB Directive which requires that parties negotiate an agreement on the matter. The directive language, incorporated into the contract, will

change to contract language after the union and the company complete negotiations on this point. This is the first time in the steel industry that this principle has ever been included in a contract.

6. Reduction of the number of classifications of mechanical and maintenance employees to three wherever practicable and the adoption for the first time in basic steel of automatic upgrading where men perform for a substantial period the work of a higher classification. These provisions become operative after a plant wage scale has been finally determined.

7. Maintenance of membership and check-off.

An innovation in the mechanics of handling disputes that get beyond the Grievance Committee has been the creation of a permanent "Board of Conciliation and Arbitration." While, heretofore, arbitrators have been chosen by the union and the company to handle disputes, the selection of these has always been difficult. However, the new board will be a perma-

nent one, consisting of three members—one designated by the company, another designated by the union, and the third, who shall be the chairman of the board, shall be mutually agreed upon by both parties. The members shall serve for the duration of the contract, subject to the right of either party to change the member it designated. The board is empowered, to meet an urgent situation, to refer disposition of any grievance submitted to it to a single arbitrator to handle the grievance in the locality where it arose.

The new agreement will set the pattern for practically every other steel company that has yet to negotiate a contract with the union.

The signing of this contract is in reality the starting gun for the remainder of the steel companies to get negotiations underway to reach agreements with the union that will be similar to this one. The 12 big steel companies with which the union does not have signed contracts have been requested to agree on a time and place for immediate conferences. Inland Steel Co. negotiations are already underway, having begun on Jan. 26. Jones & Laughlin Steel Corp. will start hearings with the union on Feb. 22. A salary conference between the union and the U. S. Steel Corp., dealing with salaried or "white collar" workers, has been set for Feb. 28.

Negotiations for the U. S. Steel

**NAVY SALVAGE:** Shearing heavy copper pipe at the Pearl Harbor Naval Supply Corps Depot for return to the United States and remelting into ingot brass or copper.



Corp., that resulted in the new contract, were headed by John A. Stephens, vice-president of U. S. Steel Corp. of Delaware. Philip Murray and several officers of the CIO-USWA including David J. McDonald and Lee Pressman, represented the union. The new contract involves only the five steel producing subsidiaries of the U. S. Steel Corp., namely, American Steel & Wire Co., Carnegie-Illinois Steel

Corp., Columbia Steel Co., National Tube Co., and Tennessee Coal, Iron & Railroad Co. Other units of the U. S. Steel Corp., such as ore producing and fabricating companies, will negotiate separate contracts at a later date.

No estimate has been made by the U. S. Steel Corp. of the added cost of the new provisions of the contract

to the company. However, at the recent financial meeting of the corporation, it was indicated that a fund of \$30,000,000 for the year 1944 had been set aside to take care of costs incurred by a new union agreement. This amount will, undoubtedly, not only cover costs to the steel producing companies, but also costs to all other affiliated companies when union agreements are reached.

## ... Steel Union Contract Change Negotiated ...

• • • Changes in the new agreements between the United Steel Workers of America (CIO) and the five steel producing companies of the U. S. Steel Corp. are summed up as follows:

### WAGES:

**Shift Differential**—4c. an hr. premium for afternoon shift work and 6c. an hr. premium for night shift work.

A day shift employee in addition to his regular overtime compensation will have the premium rate added after 4 hr. overtime. Also, he will be paid time-and-one-half on top of the 4c. premium after 4 hr. overtime. Also, if a day time employee leaves the premises and is called back to work, the premium plus time-and-one-half is in effect for all hours worked.

If an afternoon or night shift employee works overtime, time-and-one-half is paid on the premium rate for all overtime worked, in addition to the regular overtime payments.

The shift differential that applies to the shift on which time is made up shall also be paid for make-up time. The shift differential premium shall also be paid for allowed time or reporting time, when such hours fall in a shift for which the differential shall be paid.

### RATE ESTABLISHMENT AND ADJUSTMENT:

**New Jobs**—Arbitration awards shall be effective as of the date the employee is assigned to a new job.

**Changed Jobs**—Any change in a rate shall be retroactive to the date of the assignment of the employee to the changed job, or if a trial period is instituted, the employee shall be guaranteed his straight time average hourly earnings for three months preceding the change in the job if the trial period is agreed upon, and after the expiration of the trial period any change in the rate determined shall

be retroactive to the changed job, but no later than the date immediately following the expiration of the trial period.

If an employee has worked on more than one job during the trial period, the average earnings shall be negotiated between the grievance committee and the management.

**Wage Rate Inequities**—The whole subject of wage rate inequities will be negotiated first between representatives of the international union and the company, and upon failure to agree, will be referred to a commission to be appointed by the National War Labor Board.

Upgrading on the job is a matter to be negotiated between the principals of the contract.

Learners may allege a grievance that they are improperly classified and the grievance will be handled under the grievance adjustment machinery.

### OTHER WORKING CONDITIONS:

**Vacations** — One week shall be granted with pay for an employee in company service for one or more years, while an employee shall receive two weeks' vacation after five years service. The adjustments are applicable retroactively to 1944.

**Seniority** — Wherever practicable, full consideration shall be given to continuous service in event of promotions, decrease of forces and re-hiring after layoffs. Units to which seniority facts are to apply must be determined within 90 days after the execution of the agreements.

**Grievance Adjustment**—Changes in this section of the contract are: (1) A foreman must reply to a request or complaint within two days; (2) grievances not disposed of within the prescribed time in any step are automatically appealed to the next step simply by making notation on the grievance papers; (3) the "fourth

step" has been changed in that the final answer must be given within 10 days after the "fourth step" meeting.

A "Board of Conciliation and Arbitration" for final disposition of any grievance not resolved between the parties will be established by this board, consisting of three members, will hear unsettled cases and its decision is final. It will be set up in Pittsburgh, with offices maintained by the company and the union. It may, by unanimous agreement, appoint a single arbitrator to meet any emergency situation. One board member will be designated by the union, another by the company, and the third, who will be the board chairman, will be mutually agreed upon.

Any question relating to wages, hours of work and other conditions of employment, or any changes therein are matters which may be adjusted under the grievance machinery.

**Holidays**—Six holidays have been named. These are: Thanksgiving Day, Christmas, New Year's Day, July 4, Labor Day and Memorial Day. By local agreement, another day other than Memorial Day may be chosen. A holiday is counted as a day worked, whether worked or not, regardless of whether it was scheduled as a day of work or rest.

**Military Service**—An employee going into military service shall receive vacation pay for the year he entered service, provided he has not had his vacation. Also, an honorably discharged veteran shall receive either vacation pay or vacation with pay for the calendar year in which he is reinstated to employment without regard to being constantly employed.

**Severance Allowance**—Severance allowances has been awarded by the War Labor Board, but details have not yet been completed. According to the union, these details will be worked out within the next 30 days.



## Manpower Utilization Unknown Quantity in Any Labor Draft Action

### Pittsburgh

• • • One of the questions facing any manpower action by Congress is the utilization of existing labor supplies, long a subject of debate between labor, management and the war agencies. Investigations by the Mead Committee in recent weeks have centered about this subject, and blows have been struck at Navy operated shipyards as well as privately operated establishments.

Opposing views are that if existing manpower were utilized at peak efficiency, there would be no shortage, and on the other extreme there are persons who state that industry has gone as far as it can go to get additional work out of its labor.

The current stir started with the President's post-election demand for a labor draft law, backed up vigorously by the general staff. Organized labor, as well as some sections of management, have been outspoken in their criticism, both taking the viewpoint that manpower utilization is the key to the problem.

Many observers in the steel industry are critically questioning the advisability of the draft law, but, except for recent statements by the National Association of Manufacturers, which are alleged to reflect the attitude of management, no one in the industry has commented on the proposed labor draft. However, like so many things, the proof of the pudding is in the eating, and while practically all steel companies indicate they have fewer men than they need, steel ingot production has not suffered appreciably because of the manpower shortage.

In 1943, with an average monthly employment of 626,000 workers, the industry produced 88,836,512 net tons of steel ingots and 67,278,221 net tons of finished steel. However, in 1944, with an average monthly employment of 571,200, about 8.7 per cent less than the previous year, the industry produced 89,575,853 net tons of ingots and 69,553,911 tons of finished steel. The answer is obviously better employee utilization, since during the past year mechanization and improvements in steelmaking have been sacrificed because of the pressing demands for production.

One company estimated some months ago that it could use between 20,000 and 25,000 men, but this obviously was the requirement based on opti-

mum conditions. Until the war ends, there can be no such thing as the "optimum" in practically any business.

However, the spreading of work, overtime, intra-plant job juggling, and other such emergency tactics that the steel industry has introduced to get out a full quota of production, have served well.

It is general opinion now that bet-

### Labor Priority in Steel

#### Pittsburgh

• • • Steel mills in the Pittsburgh district have again been placed on the critical list for manpower. Removed several months ago, mills have had practically no referrals because of the fact that shell plants and other war goods manufacturers have been taking any surplus labor that presents itself.

ter utilization of the present agencies dealing with manpower would serve better than a labor draft. Despite the fact that the program has stumbled along for four years and an emergency still exists, there is no reason to believe, according to some observers, that a manpower draft would fill the bill. It can fail just as other programs have failed, and add only another bureau to the government. Mills in this area are now getting manpower on a high priority basis from USES, and other agencies are likewise endeavoring to direct the available manpower in this district to where it is most needed. A labor draft will not, it is believed, better this situation.

An examination of what the industry needs in the way of manpower seems to suggest that very few manpower problems would exist if the common labor shortage was eliminated. Furthermore, many workers that have entered the mills for the duration, either because of patriotic or pecuniary motives, have not contributed as much in the way of work as those whose lifetime work has been with the industry. Also, many are being employed where they are most needed, but they will not stay on the job. The threat of a labor draft has driven many into mill jobs, against their personal wishes, and may be

considered to be the type workers that would be turned up by a draft. They take any job to get in, but once in, start looking around for something better or easier.

One of the hardest hit companies from a manpower standpoint bore out the fact that manpower utilization has been greater since shortages became evident. With 1944 employment running about 8.5 per cent less than in 1943, ingot production was increased just short of 1 per cent. This is despite the fact that one of the main markets for ingots as such, lend-lease, was drastically curtailed. One of the largest companies in the country had similar experiences. With a drop of average monthly employment of 9 per cent from 1943 to 1944, ingot production remained near the 1943 peak, being about 1 per cent less in 1944 than in the previous year.

President Phillip Murray of the CIO recently demanded full investigation of the use of manpower as well as materials in industrial plants, requesting that even plants up to schedule be checked to see if conditions there could be improved. He continued that,

"We must have a determination now to end all unnecessary or luxury use of plant, materials, manpower, and management. This determination must be put into effect not piecemeal but by a decisive act to avoid further delay and obviate all quibbling or hesitation."

Mr. Murray also pointed out that, "The policies and actions of the various procurement agencies of the government must be coordinated to avoid the present prevailing confusion. . . ."

The Mead committee claims to be the recipient of many communications relating loafing, "made work," and "government (or personal) work" going on in war plants and is making a spot check of certain areas, as was done at the Norfolk Navy Yard. In describing the committee's activities, Chairman James M. Mead described conflicting figures publicized regarding the actual size of the shortage, and pointed out that coordinated information is one of the prime needs.

He asserts that manpower utilization studies, prime weapon that the War Manpower Commission has used to instruct industry and labor in making use of employees, have not been permitted in most government operated plants, giving the Army and Navy virtual blank checks on manpower.

"The manpower problem," according to the Senator, "is too complex to be solved . . . by creating a manpower

czar or passing a statute authorizing a government agency to determine by compulsion where each employee shall work. . . . What we need is a definite clear-cut policy that makes sense. Then the voluntary cooperation of management, labor, and agriculture can be expected."

Reports from Senator Mead's home town, Buffalo, are an example of the current turmoil surrounding the charges and countercharges. Newspapers widely discuss reports of plant loafing, no work to do, layoffs, plus stories of vital programs behind schedule. Plants are accused of labor hoarding at the same time that they report thousands of men short. The district WMC calls a meeting on manpower utilization and only one industry member is in attendance. One leading steel executive, long holder of a priority on manpower, is quoted as stating flatly that as far as he is concerned there is no shortage.

As reported last week, if the draft law does not pass, some system administered by the WMC will probably be implemented to make it effective enough to maintain the flow of workers into critical plants. One such plan, publicly known as the "Allentown Plan," where first tried, using rigid employment ceilings and strict referrals, now underway in Chicago, may be the solution. Indications in Cleveland and elsewhere are that modification of this plan is contemplated.

## Minute Manpower Inspection Underway to Unearth All Violations

### Cleveland

• • • Crews of inspectors from the War Manpower Commission, in a last-ditch drive toward fuller utilization of manpower, have been conducting an extensive survey to check employer compliance with WMC regulations, E. L. Keenan, WMC regional director for Ohio, Michigan and Kentucky, announced this week.

On the criterion of January findings, compliance has been much better than anticipated and indications are that most non-compliance is the result of ignorance of the regulations. Further, it is confined almost entirely to the small, less essential plants employing fewer than 100 workers.

To date, 410 illegal "hires" have been unearthed, and no employer has yet refused to release a worker. In Columbus, Ohio, for example, 37 per cent of the illegal "hires" were funneled into more essential employment, but the remaining 63 per cent could not be touched under existing regulations, since they were over age, handicapped, or discharged veterans.

Larger plants have generally complied with all regulations and one WMC area director has already decided not to audit any company em-

ploying more than 100 people. Hotels, breweries, night clubs and junk yards are selected for audits first.

Covering the extent to which employers are complying with the employment stabilization program, priority referrals, employment ceilings, and the 48-hr. minimum wartime work week, the WMC survey is receiving cooperation in the form of additional inspectors from the Wage and Hour and Public Contracts Divisions of the Department of Labor.

In Akron, which has been a sporadic labor market since the war began, 77 employers, who had hired 117 workers, were audited and of these, 27 were illegal. WMC officials considered this high, but explained that it was the result of checking places where non-compliance was suspected.

Tabulations from other cities were as follows:

City	No. Employers Checked	No. of Hires	No. of "Illegal" Hires
Zanesville, Ohio	14	65	1
Bridgeport, Ohio	72	366	25
Canton	1	97	9
Cincinnati	21	2996	227
Lorain	3	177	2
Cleveland	4	3845	507
Columbus, Ohio, area	153	2665	137
Dayton	63	233	1
Toledo	51	4345	133
Lima area	36	782	19
Youngstown	16	115	15
Grand Rapids, Mich.	15	233	30
Detroit	159	2136	485

While the employer's appeal rights are safeguarded, WMC may enlist the support of other agencies to bring about compliance and is empowered to request the War Production Board to deny critical materials and electric power to establishments which continue to violate WMC regulations.

### Shipyard Layoffs Coming

Mobile, Ala.

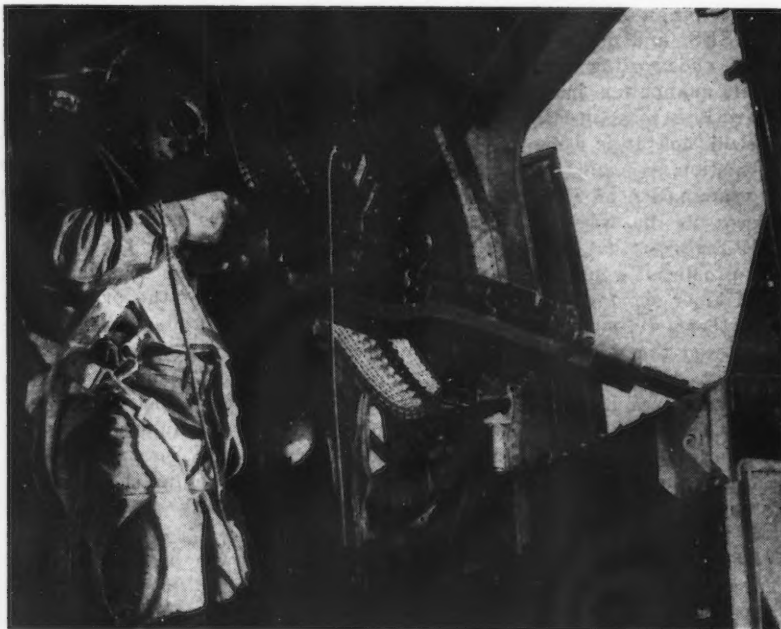
• • • Seven thousand to 8000 shipyard workers will be laid off by June 1, according to Dr. Burton K. Morley, area director of the War Manpower Commission.

Dr. Morley said the cut in ship production, illustrated by the reduction in monthly schedules for Alabama Dry Dock & Shipbuilding Co. recently, would provide men for other war-vital jobs in this area.

A recent WMC survey revealed 3600 jobs with no takers.

The Alabama Dry Dock production schedule was cut from five to three 22,400-ton tankers per month.

**AIR CREWMAN:** This Navy man is operating one of the machine guns of a *Liberator* search plane. To do the job efficiently he needs the helmet goggles, headphones, leather jacket, Mae West life preserver and parachute harness he is wearing. If he were in another theater of operations he might add a steel flak suit, heated garments, and gloves.





## Furloughed Service Men Set Fast Working Pace in Shell Plants

### Pittsburgh

• • • Before Von Rundstedt started his counter-drive against American armies that were lined along the German border in December, the need for heavy shells had become extremely serious and all-out efforts were being made to increase shell production in the Pittsburgh district, one of the major heavy shell producing areas. One of the greatest obstacles to overcome, however, in raising the output of shell was the inability of war plants to obtain skilled help.

An urgent need developed for machinists, set-up men, tool makers, and operators of turret lathes, boring mills, engine lathes, shapers, drop hammers, forging presses and milling machines. Men with these skills, however, were not available.

Realizing the critical need for these skills, the Army, at the request of the Pittsburgh Ordnance District, furnished some 725 highly skilled men who could do the jobs required, through cooperation with the unions involved, the War Manpower Commission, and the companies needing the men, a staggered system of bringing skilled men into the district from the Army was set up, beginning Dec. 10, 1944. To date, in the shell plants of the Pittsburgh area, there are 535 servicemen employed. The first of these arrived in Pittsburgh on Dec. 10, and the latest group arrived this past week. There are still 190 more to come. Likewise, other districts are drawing upon the Army's pool of skilled men to aid in shell production. About 3000 requests have been received by the Army, and about 2000 men have been withdrawn from active service and placed in shell and shell-component producing plants.

The soldiers chosen to work in these shell plants are under the direct command of the Ordnance District in which the plant is located. They are furloughed for 90 days to do the job, and it is presently planned not to renew any of these furloughs. They work on the job at the pay rate of the job and in addition receive their regular Army pay. They are in uniform everywhere except while actually working, at which time they wear fatigue clothes or ordinary working clothes. The bulk of these service men thus employed in the Pittsburgh area are returns from combat, many of

whom have just recently been released from hospitals or replacement centers. On the whole, they are extremely happy about being where they are rather than on regular military duty, and their conduct has been exemplary, since any misbehavior results in their re-assignment to active service.

Plant experience with these men has been excellent. A representative of one plant where a considerable number are employed stated that he wished he had 200 more. They are always on the job, on time, and honestly try to do a real job. Since the plan was incorporated at that plant, there have only been two man-days of time lost by the furloughees, whereas normal absenteeism runs anywhere up to 12 per cent of employment. One company that is producing 105 mm. shells indicated that its experience with these men has been "wonderful." In fact, the company went so far as to ask the Army for extended leaves for these men.

Another plant, which expressed a little chagrin and embarrassment at not being able to take care of its own manpower problems, praised highly the work these men are doing. The union has maintained the broad position that where a definite need can be shown for these men and no civil-

ian employee will be replaced or discharged by their employment, the union will approve and favor the action. Union dues from these men have been waived for the most part in closed shops, and some locals have issued the men honorary membership cards for the duration of their employment.

Bringing some 500 men into the various localities in which these shell plants are located has caused some severe housing problems. Housing must be provided by the company, and often this has been difficult. In one instance, where 22 men were brought into Bellefonte, Pa., for Titan Metal Mfg. Co., an old vacant mansion was rehabilitated. OPA furnished fuel oil rations; beds and bedding were obtained from Camp Reynolds; people of the town supplied furniture; and the building was made habitable. These men maintain the building, pay the cook and housekeeper, and stand all expenses. However, housing has been provided for all men brought in, and some have brought their wives from other parts of the country to live with them. While on duty as shell plant workers, these men stand all subsistence expenses themselves and buy their own working clothes, and safety equipment such as shoes and goggles.

All plants in the district that are working on the heavy shell program, with the exception of the Bethlehem Steel Corp. plant near Johnstown, and

**TROUBLE SHOOTING:** Operating a lathe, Pvt. Evald Wangman works on a 240 mm. shell at the Christy Park Works. He is one of the servicemen "filling in" at Pittsburgh district plants to boost production of shells.





National Supply Co. at Ambridge, Pa., are using these furloughed Army men. The accompanying table shows the plants, the number of service employees and the shell contracts on which they are working.

Another aid to the manpower shortage in foundries, tire plants, and cotton duck manufacturing plants was the inauguration of the Enlisted Reserve Corps plan, whereby men were released from the Army to take jobs in critical plants. There are 135 such employees in the foundries in the Pittsburgh area and nine more in the district's two rubber plants, Pennsylvania Rubber Co., Jeannette, Pa., and McCreery Tire & Rubber Co., Indiana, Pa.

These men are out of uniform, but subject to recall to the Army at any time. The program is indefinite in nature, with the men "leased" to the plants for a period of at least six months or longer if necessary. Continental Foundry & Machine Co.'s Coraopolis, Pa., and Wheeling, W. Va., plants each have 30 of these men. Fort Pitt Malleable Iron Co. at McKees Rocks, Pa., has 15; and the remainder are split pretty evenly among Pittsburgh Forge & Machine Co., Coraopolis, Pa.; National Roll & Foundry Co., Avonmore, Pa.; and Union Steel Casting Co., Pittsburgh.

Many of these men have, like the furloughed employees, seen service overseas and when the company no longer needs them they are recalled by the Army for reclassification and reassignment. Among the skilled men are coremakers and molders, but a large percentage of them are classified as common labor, filling a critical need in the foundries in which they are employed.

## Union Reports No Additional Furloughs of Soldiers for War Plants

### Cleveland

••• No more furloughed soldiers will be sent into war plants, according to Matthew Smith, president of the Mechanics Educational Society of America, an independent labor union representing a large number of Cleveland companies.

Army authorities in Washington gave Smith to understand, he reported, that the program of granting 90-day furloughs to soldiers with skills urgently needed in critical armament plants had been abandoned "because no more men with the necessary skills are available for temporary release."

MESA, Smith said, had no objection to the use of furloughed Army men in war production, but it did object to the employment of the soldiers in plants "where men with higher skills than the soldiers possessed were being drafted."

As a case in point, that situation was the basis of a conference of Smith, other MESA officials, Army representatives, and officials of the National Acme Co., a machine tool firm holding a number of urgent contracts and one of the companies in this area which has been using furloughed soldiers.

Reports that MESA had raised some objections to the use of military personnel in at least one war plant here brought the issue out into the open. "We merely wanted to get an explanation why the soldiers were there when men with more skill than the soldiers had were being inducted,"

Smith asserted. "There will be no reason for pressing this issue any further in view of the abandoning of the furloughing program."

Smith also stated that MESA had not required furloughed soldiers to join his organization. "We left it up to the soldiers whether they wanted to join and in most cases they signed up with no objection," he said.

Rumors that strong union pressure had been brought to bear on the Army not to send any more soldiers into industry have been traveling around government circles for several weeks. Smith said MESA took the position that if the furloughing were continued at a plant which was hiring the soldiers and at the same time losing men to the draft, the plant "would ultimately be staffed entirely with military personnel."

Some indication of the potential of union pressure can be had from the fact that in greater Cleveland alone there is a union member in seven out of every ten families and 66 per cent of all workers, men and women, eligible to membership carry a union card and their monthly dues total \$500,000.

Howard Whipple Green, a recognized statistician, has placed the adult working population of Cuyahoga County (in which Cleveland is located) excluding independent business men, management executives, and domestics in whom unions would not be interested, at 400,000. Of this number, a record-breaking total of 265,000 are union members.

## Brassert Citizenship Affirmed

### New York

••• The citizenship claim of Herman A. Brassert, president of H. A. Brassert & Co., firm of internationally known steel mill consultants, was upheld unanimously recently by the United States Circuit Court of Appeals.

Born in England in 1875, Mr. Brassert came to this country in 1897. He filed a declaration of intention to become a citizen in Pittsburgh in 1904. He lost his original citizenship certificate, and the date on a certified copy has been in dispute. The court ruled that Mr. Brassert was not responsible for the incorrect date.

U. S. Army Employees in Shell Plants in the Pittsburgh District

PLANT	No. of Furloughed Employees	Shells Produced at Named Plants
National Tube Co., Christy Park Works, McKeesport, Pa. . . . .	141	105-mm. 8-in. 240-mm.
Pressed Steel Car Co., McKees Rocks, Pa. . . . .	86	105-mm.
Jones & Laughlin Steel Corp., McKeesport, Pa. . . . .	69	8-in. 105-mm.
United Engineering & Foundry Co., New Castle, Pa. . . . .	53	155-mm. 8-in. 240-mm.
Oil Well Supply Co., Oil City, Pa. . . . .	45	8-in.
Robertshaw Thermostat Co., Youngwood, Pa. . . . .	34	Components
Titan Metal Mfg. Co., Bellefonte, Pa. . . . .	22	Components
Louis Marx, Glendale, W. Va. . . . .	20	105-mm.
Treadwell Construction Co., Midland, Pa. . . . .	20	240-mm.
Crucible Steel Co. of America, Midland, Pa. . . . .	16	240-mm.
Weirton Steel Co., Weirton, W. Va. . . . .	15	240-mm.
John R. Wald Co., Tyrone, Pa. . . . .	15	Components
Pullman-Standard Co., Butler, Pa. . . . .	12	155-mm. 8-in. 105-mm. 4.5-in.
Kelly Springfield Tire Co., Cumberland, Md. . . . .	12	8-in.
Oliver Iron & Steel Corp., West Pittsburgh, Pa. . . . .	9	105-mm.
Fletcher Enamel Co., Dunbar, W. Va. . . . .	6	105-mm.
Armstrong Cork Co., Beaver Falls, Pa. . . . .	3	105-mm.
Ballard Aircraft Co., Arthurdale, W. Va. . . . .	2	Components
Bethlehem Steel Co., West Taylor, Pa. . . . .	0	8-in.
National Supply Co., Ambridge, Pa. . . . .	0	105-mm. forgings

## General Campbell Describes Factories at Work in Liberated Europe

By DONALD BROWNE

### Washington

••• "After the buzz-bomb raid, there was a silence over all Liege—then came a sound like a tremendous sigh; it may have been a vast prayer, or—mingled curses. It sounded like the waves of the ocean lapping the sands, in the big plant where we were. It might have been a sigh, a prayer, or an expletive."

Thus Maj. Gen. Levin H. Campbell, Chief of Army Ordnance, described his experience under robomb fire in Belgium where he was studying the needs and conditions in Belgian, French and Italian industry to assist in stimulating the remanning of these industries to help piece out American war production. The other equally important mission of General Campbell was to check up on the performance of American Ordnance equipment of all kinds.

There in Liege, General Campbell visited a plant which had been hit badly twice by buzz-bombs and was still in range.

"While we were there, about 50 bombs came over each day," he said; "the nearest struck about one mile away and, of course, others struck much farther away."

The Liege plant is now forging end-connectors for tank tracks to increase the track width. Each of the new end-connectors has an extension on it called a "duck bill" to help tanks to get through the thick muds of Western Europe with greater ease than the standard tracks. The plants employed 14,000 people before the war, manufacturing rifles, pistols and machine guns.

Altogether, French and Belgian factories are now turning out among other things: structural steel, 60 mm. mortars, simple sights, gun parts such as gascheck rings and obturator spindles, and a few automotive parts such as fittings, valves, springs, carburetors, fans, small radiators, generators, starting motors and various miscellaneous parts.

More than 300 Belgian plants, including steel and foundry units, that escaped war damage or have been re-

stored to production are now turning out war supplies for the allies. (THE IRON AGE, Feb. 8, page 93). One large mill at Charleroi, Belgium, was completely destroyed and the ruined works of other mills in France gave mute testimony to the efficiency of allied bombers or German demolition squads. The greatest number of factories now at work for the allies are in France, General Campbell said.

"They left in a hurry but succeeded in taking with them most of the decent machine tools of the more modern design, leaving intact most of the belt driven stuff. These tools are like what we had in the last war and we didn't do so badly."

The General pointed out that the curve of resumed production in industries of liberated countries is steadily ascending, and said that he was immensely pleased with what he saw.

"I have sent one of Ordnance's best manufacturers, Col. Stephen Connors, works manager of the Watervliet New York Arsenal, where many big guns have been turned out for the war, as an assistant to Maj. Gen. Henry B. Sayler, Chief Ordnance Officer in the European theater," said General Campbell. "Colonel Connors will range all over Europe in helping General Sayler survey industries of liber-

ated countries. We are sending both civilian and military personnel to work in the factories."

Some factories are under direct contract with the War Department and are being run by prewar management; others are being operated as Ordnance Depots, with contracts with the French Finance Ministry by way of reverse lend-lease.

The Gnome-Rhone 6000-employee aircraft engine plant in Paris, where maintenance and repair work and engine rebuilding is being done, is under such a contract with the finance ministry. General Campbell said that he was permitted to "inflict his bad French" on the workers in a speech.

At the Gnome-Rhone plant, General Campbell had conversations with leaders of the "Syndicate," a horizontal union much like CIO. Labor leaders agreed that the urgency of production would thereafter justify three 8-hr. shifts a day, seven days a week. Before the fall of France, organized French labor was working on a 30-hr. week.

In one of the 17 plants surrounding Paris which are now in allied war production that the General visited, he was able to arrange for the working men to get one meal a day at the plant. He said that this was a great inducement to stay on the job because of food scarcity. There, at Vincennes, a system was worked out whereby one American soldier supervised four Frenchmen. This system is also employed in Italy and Belgium in Ordnance depots. General Campbell said that most Ordnance troops are now with combat units and that only a

**REPAIR SHOP:** An Ordnance technician explains the work he is doing repairing vehicle tarpaulins to Maj. Gen. Levin H. Campbell, Jr. and another U. S. Army officer. This is part of the work done by an Ordnance base shop in France, which works 24 hr. a day repairing and reconditioning worn and damaged Ordnance materiel.





certain small number of specialists were engaged in such work.

A humorous sight greeted the Ordnance Chief's eyes when he went to the Fiat plant in Florence. A huge sign painted by the American soldiers read like this: WILLOW RUN PLANT of the Ordnance Department.

The Fiat plant was taken over nearly whole and within its estimated 1,000,000 sq. ft. of floor space assembly lines are rebuilding motorized equipment and repairing and making

heavy replacements such as engines and transmissions.

There is no scrap disposition problem in Europe, the General said, in describing an odd side-light of his trip. Local citizenry not only buy all the scrap from the battlefields when it is collected by the Army, but 200 burned out tanks disappeared from a ravine near Anzio. The purchase of the scrap by Europeans was explained as an attempt to hedge inflation by putting money into material.

## Railroad Rates on Armor Plate Under Fire as Exorbitant

### Washington

• • • In a proposed report to the Interstate Commerce Commission recently, Examiner William A. Disque held that railroad rates on armor plate in carloads between official classification territory and western classification territory and in the latter section are unreasonable to the extent that they exceed the fifth class rate. Present rates for these movements are fourth class, except where lower rates are made by combination on Mississippi River crossings or other territorial border points. Commercial steel takes commodity rates in official classification territory. These rates about 15 years ago replaced rates that generally had been fifth class rates.

In western territory, commercial steel takes the fifth class rate. Armor plate rates which were attacked range from 103 to 260 per cent of those on commercial steel, averaging 114 per cent. It was asked that light armor plate rates be placed on a commercial steel rate basis and that rates on armor plate over 3 in. thick be reduced to 112.5 per cent of the commercial steel rates. Fifth class rates apply on armor plate in official classification territory and sixth class rates apply in southern territory. These rates were not found unreasonable.

Transcontinental rates on armor plate, the report said, were also unreasonable. The fifth class rate to the Pacific Coast was held to be "much too high" and reduced rates were prescribed.

The complaint against rates on armor plate was originally filed Dec. 31, 1943, on behalf of the Navy Department by the late Secretary of the Navy Frank Knox. Subsequently a similar complaint was filed by Secre-

tary of War Harry L. Stimson. With these military departments, the Maritime Commission and intervening armor making steel companies, together with shipbuilding corporations and other consumers, joined in asking for reparations. Intervening steel companies were the Carnegie-Illinois Steel Corp., Bethlehem Steel Co., and the Great Lakes Steel Corp.

Examiner Disque said that any reparations should be for the difference between the charges collected after land grant and equalization deductions were applied and charges at the rates found reasonable. This, it was pointed out, probably eliminates the claims on all shipments covered by government bills of lading as the charges collected were no doubt generally less than those at the rates found reasonable. Where shipments

on which reparation was asked were made by or to one of the complainants, the examiner said, there is no doubt about the complainant's being entitled to an award of reparation upon proof that it paid or bore the freight charges as such.

The railroads sought to justify the rates on the ground that armor plate is an exceedingly high-grade commodity and a thing definitely set apart by a wide margin from ordinary steel. On the other hand the complainants contended that many articles of commercial steel are at least as high grade and made of more or less the same kind of steel as armor plate.

Reduced rates specifically recommended cover transcontinental shipments. Rates prescribed, on shipments to the Pacific Coast, stated in 100-lb., and those now prevailing—in parentheses—follow: From Atlantic seaboard, \$2.25 (\$2.60); from Pittsburgh territory, \$2.15 (\$2.47); from Detroit territory, \$2.05 (\$2.41); from Chicago territory, \$1.95 (\$2.30).

Transcontinental rates on commercial steel shipments to the Pacific Coast are: From Atlantic seaboard, \$1.43; from Pittsburgh territory, \$1.27; from Detroit territory, \$1.19; from Chicago territory, \$1.10.

## Budd Gets Big Fuse Contract for Shells Philadelphia

• • • The Philadelphia Ordnance District, U. S. Army, recently awarded to the Budd Co. one of the largest orders for artillery shell fuses ever placed in the district.

The contract, the first of its kind undertaken by Budd, which currently is engaged in stepping up production of artillery shells at another Philadelphia plant, calls for the manufacture of fuses for 75 mm., 90 mm., 105 mm., 155mm., 8 in. and 20 mm. artillery ammunition. The company's contract for artillery shells is reported to be one of the largest released to any American manufacturer.

Under terms of the fuse contract, shipments are to start in June or earlier. When peak production is reached, 1600 workers are expected to be employed in three shifts, at least 75 per cent of them women.

The fuse manufacturing will be carried on in a special plant, where 150,000 sq. ft. of floor space is being cleared in preparation for the installation of new assembly lines, tools and other machinery costing more than \$5,000,000.

## COMING EVENTS

April 4-6—SAE National Aeronautic Meeting, New York.

April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.

### CANCELLED

Feb. 26-March 2—A.S.T.M. 1945 Committee Week, Pittsburgh.

March 19-22—American Society of Tool Engineers, Cleveland.

April—American Zinc Institute, St. Louis.

April 26-27—Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, A.I.M.E., Chicago.

April 30—May 4—American Foundrymen's Association, Detroit.

May—American Gear Manufacturers Association, general meeting.

May—General Meeting, American Iron & Steel Institute, New York.

American Steel Warehouse Association, 1945 Convention, New York.



## Steel Capacity Rises To Over 95 Million Net Tons Per Year

### New York

• • • Productive capacity of the steel industry of the United States has risen to 95,505,280 tons of ingots and castings per year, according to the American Iron & Steel Institute which reported capacity rated as of Jan. 1, 1945. That figure, marking the virtual conclusion of the industry's huge wartime expansion program, is nearly 1,500,000 tons greater than the annual capacity of 94,054,550 tons reported in midyear 1944.

Since mid-1940 when the national defense program was started, close to 14,000,000 tons of new annual capacity have been added by the steel industry.

Annual capacity for the production of pig iron and ferro-alloys at the start of 1945 was 67,313,890 tons. This was a decline of 1,132,420 tons from the 68,446,310 tons reported July 1, 1944, and was caused largely by the abandonment or dismantling of certain furnaces not now economic to operate.

The industry's annual capacity for the production of by-product and bee-

hive coke was 61,919,840 tons as of Jan. 1, 1945, an increase of 469,860 tons from the 61,449,980 tons reported Jan. 1, 1944. All of the increase was accounted for by new by-product coke ovens.

Open hearth steel capacity was rated at 84,171,590 tons annually at the start of 1945, a gain of nearly 1,600,000 tons from the 82,604,600 tons reported last July 1.

The increase reflects chiefly enlargements of some furnaces and the decision on the part of certain companies to assign to steel-making a few open hearth furnaces that previously were used to melt down scrap and pig iron preparatory to final refining in electric furnaces.

Electric furnace capacity increased 83,740 tons from July 1, 1944, to Jan. 1, 1945, annual capacity of these facilities now being rated at 5,455,890 tons. The capacity of bessemer steel production facilities was reduced by 200,000 tons to 5,874,000 tons annually as of Jan. 1, 1945. Capacity for making steel by the crucible process remained unchanged at 3800 tons.

face of tremendous natural and wartime difficulties, particularly of transport and materials. Almost the entire plant, equipment and auxiliary structures, from the smallest nuts, bolts and nails to lumber, steel, glass, piping were shipped from the United States.

The grade of vanadium ore found is such that shipment as raw ore would be prohibitive. With the new facilities, the raw ore is crushed and dried

at the mine mouth. Dropped down six miles of narrow gage road to Jumasha, it is leached with water and chemicals, filtered, precipitated, dried, packed and shipped.

From the Jumasha plant the vanadium ore concentrates are shipped through Lima to the Vanadium Corp. of America plant at Pittsburgh for smelting and conversion to use in manufacture of high speed tool steels and other important steels, to which this ore imparts spring and resilience.

## Railroad Locomotive Fuel Coal Policy May Affect Lake Movement

### Cleveland

• • • A declaration of policy effective April 1, concerning coal for railroad locomotive fuel use, which may affect the 1945 movement of coal on the Great Lakes to a marked extent, has been issued by the Solid Fuels Administration through Deputy Administrator C. J. Potter.

This declaration, which is not an order and may possibly be subject to modification, would prohibit movement by lake of eastern coals for locomotive fuel use in favor of midwestern coals.

During 1944, approximately 3,000,000 net tons of coal was shipped through Lake Erie ports for use as railroad locomotive fuel in this country. Should the declaration be intended also to shut off eastern coal for Canadian railroads, it embraces an additional approximate 2,000,000 tons, or a total of 5,000,000 tons.

It was also stated in this declaration of policy that steps are to be taken to determine which industrial consumers supplied by lake movement can convert from Appalachian to mid-west coal.

## Leaching Plant In Peru Completed For Vanadium Ore Work

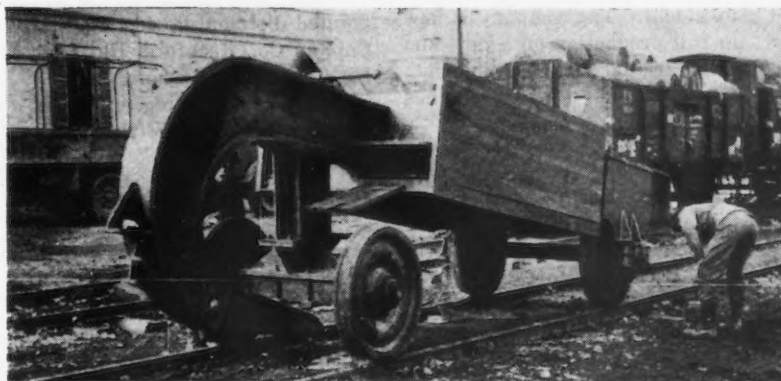
### Pittsburgh

• • • The highest leaching plant in the world, nearly three miles above sea level in the Andes Mountains in Peru, has been completed by the Rust Engineering Co., for Vanadium Corp. of America to speed production of vanadium essential to steelmaking.

Located at Jumasha, at 14,200 ft. elevation on the eastern ledges of the central cordillera of the Andes, the new plant is served by a diesel power plant, pump house, boiler house, 150 dwelling units for native labor, and hotel additions also erected by Rust. Still higher, at a 15,600 ft. elevation at the mouth of Vanadium Corp.'s Minaragra Mine, Rust also designed and built a crushing plant and drier. Down from Jumasha, along the line of transportation to the sea near Lima, oil and acid storage facilities and warehouses have been constructed.

These new installations were begun two years ago and completed in the

**ROAD WRECKER:** Ten tons of railroad wrecking equipment captured from the Nazis was hauled, probably by a locomotive along the road, breaking up ties and twisting rails as it goes.



## Industrial Briefs . . .

• **ORDNANCE CONTRACTS**—Contracts for construction of chemical facilities to increase explosive production at two ordnance plants have been awarded by the War Department to The Rust Engineering Co., Pittsburgh, and Birmingham, Ala. The work will cost in excess of \$2,000,000.

• **PURCHASES STOCK**—Vought & Williams, Inc., New York, steel jobbers, have terminated their business and Bushwick Iron & Steel Co., Inc., Brooklyn, have purchased their stock of hot rolled steel.

• **BUYS PLANT**—Trico Products Corp., Buffalo, has purchased the Main Street plant of Ford Motor Co., which was last used by Ford in 1931 and has since been occupied by several companies including Bell Aircraft Corp. The purchase increases Trico's factory floor space by a third. Ford operations in Buffalo are now concentrated in its plant on the water front.

• **EXPANDING**—Approval has been given the Dayton Malleable Iron Co. by the regional War Production Board, Cleveland, for the erection of a \$131,000 building to be erected at the G, H and R Division of the company. This new addition will increase the facilities of the maintenance department and pattern shop.

• **CRANKSHAFT OUTPUT**—Since Pearl Harbor more than 52,000 precision made 14-cylinder aviation crankshafts for 1700 hp. "Cyclone" engines have been machined and shipped by the Ohio Crankshaft Co., Cleveland, according to William C. Dunn, president. The company is now in full production on a new and larger radial engine crankshaft for 18-cylinder Cyclone engines going into B-29 bombers.

• **PEAK PRODUCTION**—War production by Borg-Warner Corp., Chicago, again is approaching the peak level achieved in early 1944, according to C. S. Davis, president. More than \$49 million in new war orders were received in December.

• **NEW PUMP BOOK**—Designed to aid the beginner as well as the experienced pump engineer in the purchase or sale of pumps in the marine, manufacturing, petroleum and process industries, the Geo. D. Roper Corp., Rockford, Ill., have published a new book entitled "How To Solve Pumping Problems," which may be obtained free by writing the company.

• **FORMS NEW SOCIETY**—The newly formed Detroit Spectrographer's Society met for the first time on Jan. 22, and has for its purpose the dissemination of knowledge pertaining to spectrochemical analyses and to assist in the development of improved methods and technique as it affects spectroscopy, chemistry and electronics.

• **POSTWAR PLANS**—In the post-war period, the Wire Rope Corp. will build a plant in Hamden, Conn., to cost \$1,000,000 exclusive of equipment.

• **CONSTRUCTION**—The War Department has announced authorization for conversion of existing plant known as Washington Warehouse No. 7000 at Washington, Pa., for forging facilities, will be known in the future as Washington Forging Plant. Estimated cost of construction is \$725,000. The War Department also authorized construction of forging and machining facilities at the Fall Creek Shell Plant, Indianapolis, at an estimated cost of \$990,000.

• **DISTRIBUTOR**—Garrett Supply Co., 3844 South Santa Fe Avenue, Los Angeles, has been appointed distributors for Barber-Colman Co., Rockford, Ill. Barber-Colman has opened a machine tool engineering and sales office at 832 West Fifth Street, Los Angeles.

• **EXPANDING**—The Titan Metal Mfg. Co., Bellefonte, Pa., has expanded its forging department, and at the present time has some open capacity for heavy brass forgings up to 100 lb. in weight.

## 700 Riggers Go Out At Pittsburgh J & L Plant

Pittsburgh

• • • About 700 riggers and maintenance workers of the Jones & Laughlin Steel Corp.'s Pittsburgh works walked out on strike Tuesday of this week protesting work being done by Rust Engineering Co. at the new Keystone Works 105mm. shell forging plant. These men want to do the work that Rust is doing on the new project.

Rust started work on the construction of this new shell forging plant some weeks ago and the plant is scheduled to go into production some time in the early summer. The strikers are not picketing the plant, but are only protesting the outside firm's activities.

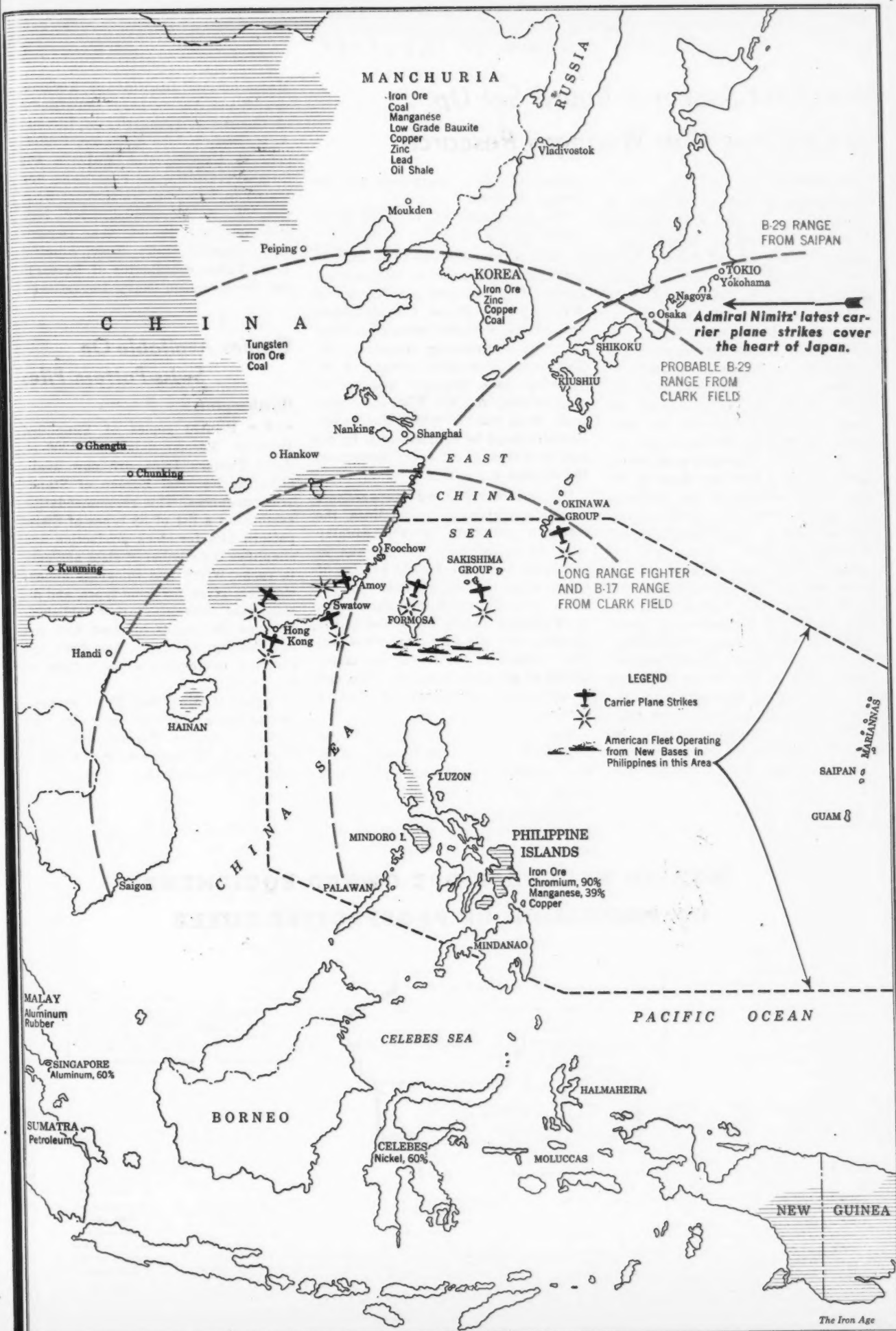
### LOSS OF PHILIPPINES STRIKES BLOW AT JAP ECONOMY: Although the movement of American sea and air power in to blockade the China Sea will have a profound effect on Japan's ability to fight a long war, stockpiles and Chinese resources added to her own will probably prove sufficient for at least the next two years.

Success at Iwo Jima in the Bonins will throw the arcs of fighter cover and B-24 and B-17 bombardment directly across all of Japan's supply lines to the south, and will greatly strengthen the power of B-29 attacks against the Nipponese Archipelago itself. The long range planes, if based at Iwo, will be dangerous even to the supply routes between Manchuria and Japan.

Protected by air cover from Iwo in the north, an allied blockade across the China Sea will have the land based anchor that otherwise carrier-based operations would have lacked for continuous operations against Japanese shipping.

Among most important effects of MacArthur's successes will be the loss of 1,300,000 tons annual iron ore production in the Philippines which has been going to Japan, and a prewar production of about 74,000 net tons annually of chrome ore, according to American Iron and Steel Institute statistics.

While Japan's supply lines from her newly won resources in the islands south of the Philippines will now be straddled by American planes and ships, the vulnerability of these tin, rubber, and petroleum supplies have long been recognized by the Japs, and estimates are that two to four years' stockpiles of these materials have been built up. Most of these materials are also available for development in some part of occupied China.





## New Joint Research Board Set Up To Continue War Weapons Research

### Washington

• • • Formulation of programs to develop modern weapons of war will be the purpose of the newly established Research Board for National Security, made up of civilian and military scientists. Set up within the National Academy of Sciences announcement of the establishment of the board was made by Secretary of War Henry L. Stimson, Secretary of the Navy James Forrestal and Dr. Frank B. Jewett, president of the Academy. The board will be continued upon the liquidation of the Office of Scientific Research and Development pending final consideration by Congress on creation of an independent agency. It consists of 20 civilian scientists and an equal number from the Army and Navy.

Composed of high ranking officers responsible for the needs and plans of the Army and Navy, together with an equal number of distinguished representatives of science, engineering, medicine and industry, this board includes many of the features of the Office of Scientific Research and Development, which has proven so successful as a wartime agency in mobilizing civilian scientists and coordinating their work with the re-

quirements and operations of the Armed Services.

The Secretaries of War and Navy said:

"This war emphasizes three facts of supreme importance to national security. (1) Powerful new tactics of defense and offense are developed around new weapons created by scientific and engineering research. (2) The competitive time element in developing these weapons and tactics may be decisive. (3) War is increasingly total war, in which the Armed Services must be supplemented by active participation of every element of the civilian population.

"To insure continued preparedness along far-sighted technical lines, the research scientists of the country must be called upon to continue in peacetime some substantial portion of those types of contribution to national security which they have made so effectively during the stress of the present war. By such peacetime service, moreover, there will be maintained at all times scientists who can be immediately mobilized for effective service.

The membership of the executive committee of the board follows: Karl T. Compton, chairman - president,

Massachusetts Institute of Technology; Roger Adams, head, Department of Chemistry, University of Illinois; A. H. Dochez, John E. Borne, Professors of Experimental Medicine and Surgery; College of Physicians and Surgeons, Columbia University; Brig. Gen. W. A. Borden, director, New Developments Division, War Department Special Staff; Rear Admiral J. A. Furor, coordinator of Research and Development, Navy Department.

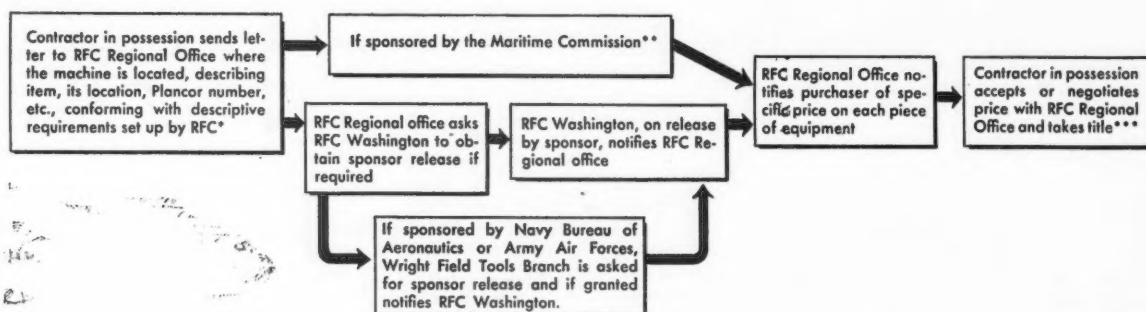
### Copies Available On Swiss Pattern Files

#### Washington

• • • Printed copies of Simplified Practice Recommendation R206-44, Swiss Pattern Files, are now available, the National Bureau of Standards announces. This recommendation establishes a list of 38 types of Swiss pattern files for stock production and simplifies the number of sizes and cuts in each. Width and thickness dimensions are given for some types, and dimensional tolerances are established. Because the names of most files are not descriptive, there has been included a description of each type of file listed.

Copies of Simplified Practice Recommendation R206-44 may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25.

## HOW TO PURCHASE DPC OWNED EQUIPMENT IN POSSESSION OF PROSPECTIVE BUYER



\*RFC gets release from prime lessee for equipment in sub-lessee's possession which sub-lessee wants to buy.

\*\*RFC can sell to contractor in possession without further sponsor concurrence as long as the recapture clause is signed by the contractor.

\*\*\*RFC Regional Office can handle any group of machines sold to one plant up to \$1,000,000 without Washington approval. A single sale of more than \$1,000,000 must be approved by RFC Washington.

If a metal cutting standard machine tool, will negotiate sale on basis of SWPA formula after obtaining sponsor release. If a metal or other material forming machine tool, OPA formula applies: 8% discount per annum of cost to government from date acquired by government to negotiated sale date. (Pressure forming tools including forms, presses, and dies, also upsetters, forging hammers and cranes.) If equipment such as furnaces, ovens and degreasers, or special purpose machines, etc., negotiated price on basis of cost to government.

This chart was prepared from data obtained by the Automotive Council for War Production, Detroit.

*Now...*

# More Forgings Per Sinking with the New BARIUM DIE STEEL

## A New Development

BARIUM Die Steel is the result of a new and special analysis perfected in Barium's laboratories and plant by one of the country's leading steel makers.

**Longer die life** and lessened die cost is assured because of the high quality and controlled grain flow and uniform structure of BARIUM Die Steel.

**From raw material** to finished product, Barium's *unified control* system embraces expert melting, forging under large presses and hammers by skilled workmen, modern heat-treating and tempering supervised by metallurgical experts.

**While no more costly** than competitive makes, BARIUM Die Steel, due to its unsurpassed quality and longer resistance to wear, has enabled users to get *more forgings per sinking* and thus substantial savings in die costs.

**Production records** of Barium's customers, from large and small forge shops, testify to the finer performance and economies of BARIUM Die Steel.

**Your inquiries** concerning BARIUM Die Steel will receive prompt attention. One of our representatives will be glad to call upon request. Write or wire...



**B** **BARIUM**  
**STEEL CORPORATION**  
CANTON 1, OHIO

*Producers of Carbon, Alloy, and Stainless Steels — Heavy Forgings — BARIUM Die Steel and Die Blocks — BARIUM Piston Rods — BARIUM Hammer Rams.*

## AAF Experimental Fighters Show Unusual Design Innovations

### New York

• • • Announcement of a group of fighter planes now serving as flying laboratories for the Army Air Forces includes the fact that they are not now scheduled for quantity production. Included in the disclosure are many of the most radical propeller-powered craft seen in this country.

Pointing up the trend toward jet developments for fighters, all of these "might have beens" are propeller powered, although it would be premature to assume that there may not yet be conventional reciprocating engined craft put in production before the gas turbine powered planes take over completely.

Among the stranger appearing ships which have been built are a "backward-flying" Curtiss XP-55, a twin boom pusher built by Vultee designated the XP-54, and an all-plywood midget built by Bell designated the XP-77.

Official Army releases describing photographs of the new planes waxed somewhat dubious if not downright critical of certain of their performance characteristics. For example, the flight of the XP-54 was stated to be "fairly normal," while the backward flying XP-55 was said to be highly maneuverable, but also said to possess vicious stall characteristics. If true, these are the frankest critical discussions of Air Forces materiel to come from Air Forces sources during this war.

Designed and built by the Vultee Aircraft Corp., probably before its merger with Consolidated, the XP-54

was built largely of magnesium, giving it an important advantage in weight, although the use of this material for highly stressed parts remains undecided. It is powered with a Lycoming engine and pusher-type propeller in a twin boom pattern made familiar by the Lockheed P-38. The wings are swept forward, with leading edge slots for engine cooling, and comes gadgeted with a propeller to raise the pilot into his compartment.

The strangest appearing of them all, the Curtiss XP-55 Ascender, has its elevators mounted far forward on the fuselage, wing mounted well back to the rear, with rudders mounted at each wing tip. It has been under development for some time in Curtiss-Wright's St. Louis plant. It is powered with an Allison engine located behind the pilot, and the propeller is equipped with a jettisoning system, in case it becomes necessary for the pilot to bail out. A new suggestion for the old propeller blade bugaboo on pusher craft, a bugaboo strong enough to have ruined plans for many another worthy fighter, this jettisoning system or some similar one may prove the answer that will pave the way for future pusher developments.

First effort in the field by the newcomer McDonnell Aircraft of St. Louis, Mo., the bat wing XP-67 is said by the Army to be an effort to "prove certain flying wing theories." The twin Continental engines are arranged to utilize a turbo-jet effect at the rear of the engine nacelles for additional power. A battery of six 37

mm. cannons probably contributed to too long takeoff runs. Otherwise, performance was said to be normal.

Designer Don Berlin, formerly of Curtiss-Wright, made his first contribution at Fisher in Cleveland with the conception of the XP-75, which was to be a super-rushed long-range fighter. To speed quantity production, P-40 wings, with an added center panel, a P-51 fuselage and an A-24 empennage were to be joined about a 3000-hp. Allison engine and pulled by a counterrotating Aero products propeller. This project required many modifications resulting in an almost completely new design weighing about 20,000 lb. Efforts were made early in 1944 to put the plane in production, but the project was abandoned with other aircraft cutbacks last fall.

One of the most unusual designs is the complete reversal of fighter craft trends evident in the Bell built XP-77. Designed by R. J. Woods, who was responsible for the pattern of the P-39, it is said by him to be "designed to counteract some of the growing fighter plane tendencies and to attempt to prove that a good little plane is as good as a good big plane."

Exclusive of the fact that it is built of plywood, as its design was laid down in the face of an impending shortage of aluminum, the use of a small Ranger V-770 inline engine for performance even approaching that of conventional fighters indicates that the planes' overall weight must be slight.

The Air Forces statement that it has postwar fighter trainer possibilities because of the feeling of high speed seems to merit further consideration, particularly if the Army should ever again be forced to consider the cost factor in its training program.

**ALL PLYWOOD VENTURE:** Although the experiment in the use of molded plywood sheets was designed to avoid an impending aluminum shortage, the new design features of the Bell XP-77, midget experimental army fighter may point to important developments in the postwar fighter trainer field.



### Indiana Assembly Has Fair Employment Bill Pending

#### Indianapolis

• • • Establishment of a state board on fair employment, and prohibition of discrimination of employment by employers or in membership by labor organizations because of race, color, creed, national origin, or ancestry, is provided by Senate bill 75 introduced to the State General Assembly here. The bill would affect steel plants in northern Indiana, which employ a substantial amount of colored help.



# The CONE AUTOMATIC MACHINE COMPANY



sees many

## GOOD THINGS AHEAD

It is reported that . . . . .

Through recent explorations our known reserves of bauxite (source of aluminum) have been increased by more than 100 million tons. *Science News Letter.*

get ready with CONE for tomorrow

The National Postwar Products Exposition is scheduled to open March first at the Chicago Coliseum. *Marcus W. Hinson, Ex. Mgr. 1513 S. Wabash Ave., Chicago 5.*

get ready with CONE for tomorrow

A new tractor-drawn farm implement plows, discs and harrows in one operation. "Till-Master", *Till-Master Mfg. Co., Portland, Oregon.*

get ready with CONE for tomorrow

Today's scientists have revived a four-thousand year old method of killing insect pests with fine dusts. These dusts adhere to the insect's skin or casing and interfere with its water balance. Death results from thirst. *Dr. H. V. A. Briscoe, Imperial College, London.*

get ready with CONE for tomorrow

A railroad now has one-hundred plywood box cars and one thousand on order. The weight saving is said to be about two tons per car. *Great Northern Railway.*

get ready with CONE for tomorrow

A new "de-barker" is being used in some pulp mills that removes the bark from logs by the force of a jet of water at 650 pounds pressure without removing any wood. The saving in wood is said to be as high as 20%. *Scientific American, Oct. 1944.*

get ready with CONE for tomorrow

The continuous injection molding of plastics is made possible by a new machine. *Chrysler Corp.*

get ready with CONE for tomorrow

A new electric iron requires no cord but absorbs heat from an electrically heated and thermostatically controlled base. *Eureka Vacuum Cleaner Co., Detroit.*

Jet propulsion may be used to power sailplanes and gliders and, in miniature, for flying models. *McGraw-Hill Overseas' Digest.*

get ready with CONE for tomorrow

A university engineer has announced the discovery of a new type of concrete, useful for building construction, that is stronger than steel and lighter than aluminum. *Northwestern University.*

get ready with CONE for tomorrow

A new \$1,800, four-room house will come directly off the assembly line on to a truck for delivery. "Wing-foot Homes", *Goodyear Tire and Rubber Co.*

get ready with CONE for tomorrow

A "zipper" fastening has been developed that is claimed to seal in liquids and gases. *B. F. Goodrich Co.*

It has been stated that the weight of aircraft engines has been reduced about 40% since the beginning of the war. *Aircraft Yearbook 1944.*

get ready with CONE for tomorrow

Manufacturers of the "jeep" plan to sell it to farmers and are reported to have ordered 25,000 bodies for this purpose. *Willys Overland.*

get ready with CONE for tomorrow

A machine has been patented for making barrels out of cardboard for packing butter, flour, sugar, chemicals, fruits, or small parts. *Everett Industries, Akron.*

get ready with CONE for tomorrow

Aviation and electrical engineers are collaborating on an electric drive for aircraft. This will, if practical, permit the location of engines in the fuselage and do away with nacelles in the wings. *Hughes Aircraft Co. and Westinghouse.*

get ready with CONE for tomorrow

One of the country's largest grocery chains is planning to ship fresh fruits and vegetables to its markets by airplane. *A & P.*

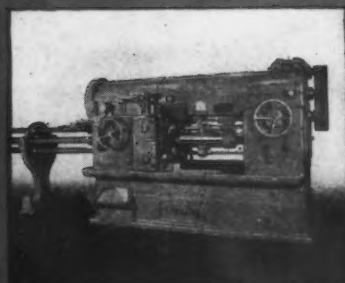


Here is performance

that is definitely

## AHEAD

This part calls for extreme accuracy and yet requires wide forming cuts on a variety of diameters. In one position an attachment taps an inside thread 5/16"-18 while, at the same time, a die cuts an outside thread 5/8"-27. Produced on the 6 Spindle Conomatic at the rate of 12.5 seconds per part.



# CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

14

## Maintenance of Membership Evasion Tried by Engine Parts Firm

### Cleveland

••• Despite the din of a rising chorus of production demands from almost every branch of the armed forces, it seemed last week that the voice of a CIO union espousing its cause in a maintenance of membership solo could be clearly heard.

Three days after the Lamson & Sessions Co. first fired five women employees on order of the Fifth Regional War Labor Board for failure to maintain good standing in the United Automobile Workers (CIO) as allegedly required by a maintenance-of-membership clause in the company-union contract, the company rehired the women as "new employees."

This was revealed at a hearing of the regional labor board to which the company was summoned to explain why it had not complied with the board's order of January 9 that the five women be fired if the union should so request.

Further investigation revealed that the company did fire the women January 19, following formal request by the union, and then re-hired them January 22 through the regular employment procedure, including physical examinations.

At the conclusion of the hearing, the board decided to certify the case to the National War Labor Board immediately for the purpose of taking suitable action to obtain compliance with the January 9 order. The three industry members of the regional board dissented from this decision.

Frederick H. Bullen, regional board chairman, told company representatives at the hearing that the board believed the company violated the order by re-hiring the women and said, in effect, that asserting they were new employees was a subterfuge.

Chester Nikodym, company labor relations adviser, insisted that Lamson & Sessions had complied with the order, which, he said, called only for the discharge of the women on union request and did not prohibit their re-hiring.

"On many occasions this board has ordered unions to send their striking members back to work," Bullen said. "In any such case, if the workers went on strike again in a few days, would you call that compliance with the return-to-work order?"

Nikodym and J. G. Fogg, company attorney, replied that it would depend

on whether the new strike was for the same reasons as the old.

Bullen held that the Jan. 9 order did, in fact, prohibit rehiring the women, since it upheld a maintenance-of-membership clause that was still in effect. But the company questioned whether the clause was still in effect, because, its spokesmen said, the union had asked cancellation of the contract containing the clause and the new contract had not been negotiated.

Nikodym said that the company had accepted the clause "under compulsion" to avoid seizure of its properties in May, 1943; that the company was still opposed to it and that the company had originally understood that after May, 1944, their employees would be free to decide whether they wanted to remain members of the union.

Efforts of the company to introduce statements by Roy H. Smith, president, and Harold J. McMahon, plants manager, that the women were rehired because they are "making a vital contribution to the manufacture of airplane engines" were ruled out by Bullen as irrelevant to the main question.

Nikodym, however, managed to squeeze into the record the statement that the women's failure so to produce would result in a breakdown of the engine program. He said, in answer to questioning, that the women, when fired, lost their seniority, which amounted to three years for two of them, four years for another, ten years for a fourth and twenty-five years for the fifth.

Pointing out that the maintenance-of-membership provision had been accepted as the most appropriate answer to disputes concerning unions' demands for security, Bullen added: "The company has not seen fit to carry out the requirements of maintenance-of-membership, and in so doing has not made the contribution expected of companies and unions during war time."

Nikodym replied that the company believed it could make its greatest contribution to the war effort by assuring the continued production of aircraft engine parts.

Bullen told reporters that the issue presented was unique in this region and might also be unique in the experience of the national board. In a statement issued after the hearing, Bullen said, in part: "The evasion in this case is clear. If orders of the War Labor Board are to be brushed aside by such flimsy devices, then the peaceable settlement of all war-time disputes is seriously endangered."

**BAT WING FIGHTER:** First product of McDonnell Aircraft, newcomer in the field, is the XP-67, bat wing twin engine fighter powered with Continental engines. It is arranged to utilize the jet effect of the exhaust from the engines. It is among the group said to be not scheduled for quantity production.





Pouring a double Thermit weld in fabricating a ship stern frame.

## *A Lesson from a* **VICTORY SHIP**

Thermit welding's speed and effectiveness have been utilized in fabricating separately cast sections of the huge stern frames of Victory ships built for the U. S. Maritime Commission.

The application is one of the shipyard success stories of the war. It provides a worthwhile lesson for foundries and those who produce heavy machinery and equipment. Thermit welding of smaller castings, forgings and flame-cut shapes into large units, has many advantages. These include: minimizing the possibilities of flaws likely

to occur in very large castings, saving pattern work and simplifying handling and shipping.

The Thermit process is also used extensively for the repair of large crankshafts, pinions, rolls, machine frames and other heavy parts, with considerable savings in production time and replacement costs.

Write for a copy of "Thermit Welding" or consult Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, So. San Francisco, Toronto.

**Thermit**  **Welding**



## Mark-Ups to Be Added On Pipe Resold From Supplemental Storage

Washington

• • • Effective Feb. 15, OPA has authorized resellers to add warehouse and jobber mark-ups to mill prices in resales of pipe and tubular products from supplementary storage or warehousing facilities. This action, taken through Amendment 28 to Revised Price Schedule No. 49—Resale of Iron and Steel Products, is designed to prevent the penalizing of steel warehouses and jobbers who because of a shortage of space or transportation cannot store all of their stocks on their own premises.

Previously these mark-ups could be charged only if the warehoused pipe or tubular products actually had been unloaded, stored or delivered from premises regularly maintained by an owner of the material for the purpose of performing warehousing operations upon the materials. Warehousing was defined as meaning such operations as storage, cutting pipe to length designated by the buyer, threading the end of pipe and fitting pipe with coupling.

The amendment provides that the warehouse mark-up may be charged by the reseller or any pipe or tubular products unloaded, stored and delivered from any premises regularly maintained for such operations by any person except the producer or a holder of excess stock.

OPA also announced that warehouses and jobbers could apply to OPA for permission to charge warehouse prices on resales of iron and steel products other than pipe and tubular products delivered from similarly defined supplementary facilities when: (1) the seller expects to deliver from stock stored temporarily at premises maintained by persons other than a producer or holder of excess stock, (2) emergency conditions do not permit him to store the material at premises he regularly operates, and (3) when a substantial portion of his deliveries are not expected to be made from the supplemental space.

Application for permission to charge warehouse prices on resales of iron and steel products (other than pipe or tubular products) stored in supplementary storage or warehousing facilities are to be made to the OPA Iron and Steel Branch, Washington 25, D. C.

OPA said permission to charge warehouse prices on such sales will be granted only where the physical limitations of the seller's own warehouse compels him to store material for a short time at outside facilities.

Applications may be made to OPA also for permission to charge warehouse prices for iron and steel products allocated to a reseller by WPB, and held for reshipment subject to the direction of that agency, even though the material is not stored on the warehouse's own premises.

Warehouse ceiling prices for iron and steel products generally, it was

pointed out, are the mill prices plus mark-ups of 25 to 66 2/3 per cent.

OPA further announced the following clarification of the price regulation governing resales of iron and steel products: For direct mill shipments of special name steels—those differing in chemical analysis and quality from standard mill specifications on which the seller takes the responsibility of performance—special permission to charge warehouse prices will be granted by OPA only where a higher than mill price is found fair and equitable, and in no case will a warehousemen's price thus authorized be higher than he charged on April 16, 1941. Previously there had been belief in some circles that when permission to charge warehouse prices on direct mill shipments of special name steels was granted, the seller automatically could charge the highest prices at which he sold the steel on April 16, 1941.

## Producers of Metals Can Get on Urgency List if Warranted

Washington

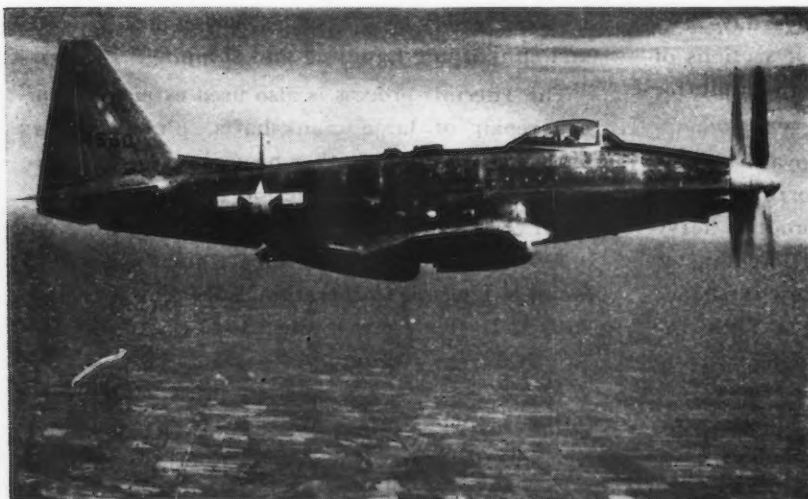
• • • Steel, copper and aluminum producers can now get on the "must" or national production urgency list for special consideration in the recruitment of labor since Feb. 9 when the WPB production executive committee took this action.

This does not mean that all producers of these metals get on the list or even that every producer will get the same priority treatment. Only those mills whose production is in danger of falling behind schedule, or is falling behind, or whose production is considered extremely important by the local production urgency committee and the United States Employment Service will get on the list. Naturally mills whose production is greatly endangered by manpower deficits will get greatest preferential treatment.

Tudor Bowen, deputy vice-chairman for field operations sent out telegrams to all production urgency committee chairmen to the foregoing effect and described production as all CMP materials and their raw products. Foundry and forge shops are not included since they are otherwise covered on the "must" list.

Under this arrangement, it is contemplated that specific departments of mills may get on the list, or the whole mill depending on circumstances.

**HIGHPOWERED POLYGLOT:** First effort of Don Berlin, designer of the Curtiss P-40 in his new position at Fisher's aircraft plant in Cleveland is the P-75. It uses a 3000 hp. Allison engine to pull P-40 wings, a P-51 fuselage, and an A-24 tail, but is no longer scheduled for quantity production.

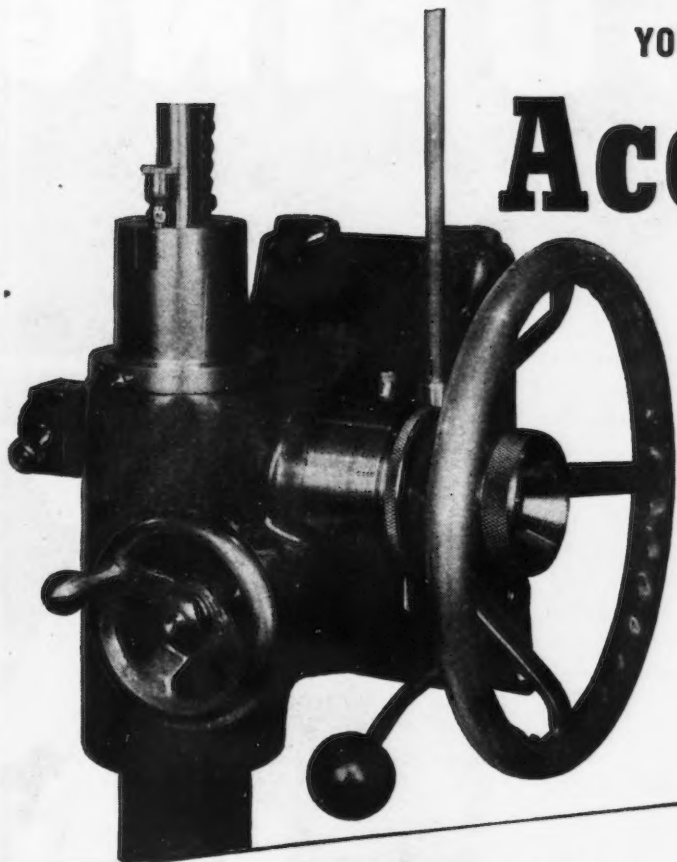


HOW NICKEL HELPS

# Maintain

YOUR MACHINE TOOL OPERATING

# Accuracy...



Minimize Thermal-Induced Error  
by Use of Low Expansion Alloy

## SECURE INCREASED PRODUCTION

Competitive conditions increase the value of units that provide high accuracy and output.

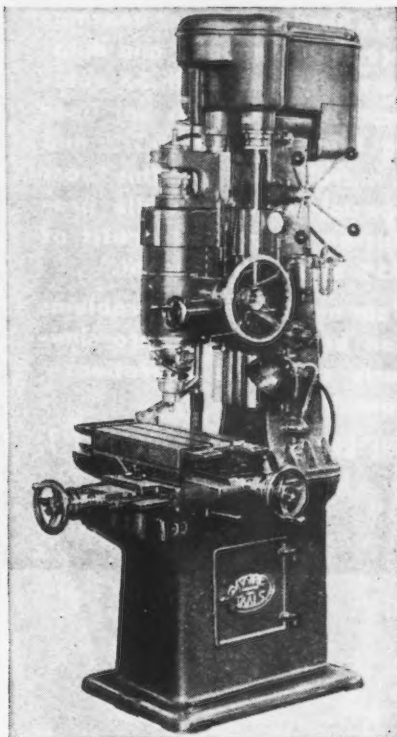
But accuracy and output fall sharply when temperature changes, even though slight, cause troublesome dimensional changes in castings such as spindle housings. For example, in jig borers and grinders, as much as .0003" to .0005" change in spindle location has been caused by expansion and contraction of housings.

Such deviations reduce output ... imposing need for warm-up

before jobs can be set ... requiring constant readjustment during operations.

Thermal-induced error can be reduced to a negligible minimum ... with Type 6 Ni-Resist ... commonly termed "Invar Iron". Castings of this low expansion alloy, containing 36% Nickel, have proved successful even under very wide temperature changes.

We invite consultation on the use of Nickel Cast Irons and other alloys containing Nickel. Send us details of your problems for our recommendations.



Moore Jig Grinder with Spindle Housing of Low Expansion "Ni-Resist".

### Here's what J. R. Moore\* says about Type 6 Ni-Resist:

"Since we started using 'Invar Iron' ... we have found that we have been able to virtually eliminate the warming-up periods previously required to make accurate settings or determine accurate locations. The overall efficiency of these two machines is probably increased by at least 20% and no difficulty on this score has since been encountered by users. This is an important factor, particularly in the use of machines intended to work within tolerances of ten-thousandths of an inch."

\*Production Manager and Secretary of the Moore Special Tool Company, Inc., Bridgeport, Conn.

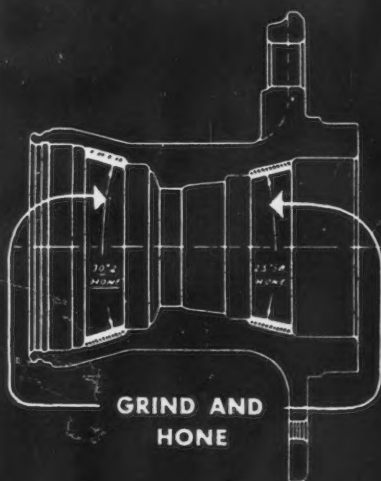
THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N. Y.

# PRODUCING

Two hardened taper bearings are simultaneously and automatically finished in 55 automotive wheel hubs per hour to tolerances of .001" and 3 micro inches with this Cross Special Machine, while producing an annual profit of 35% on the investment.

Your manufacturing problems can be converted into similarly successful operations—consult Cross.

THE CROSS COMPANY, DETROIT 7,  
Michigan, Department 102



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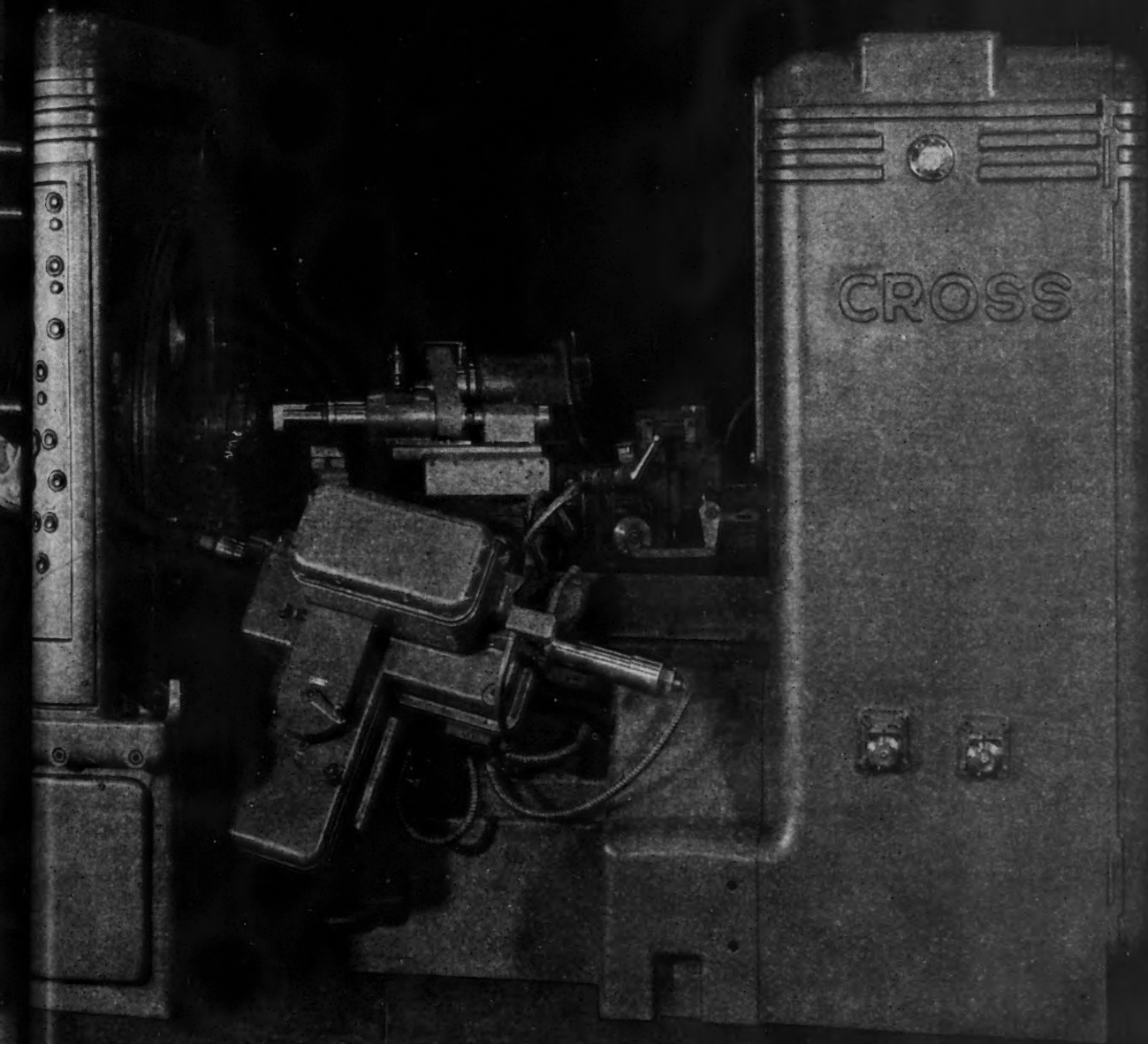
Cleveland

•

Dayton



# For Profit . . .



S-17

## **SPECIAL MACHINES**

for automatically performing any one or a combination of metal cutting operations  
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

## Lagging Plants May Request Larger Farm Machinery Quotas

### Washington

• • • WPB has announced that in order to help compensate for production lags in many items of farm machinery, plants that are not running at full capacity and have the necessary labor available may apply to the board for authorization to make more than their approved quotas of these items.

Direction 6 to the farm machinery order, L-257, establishes uniform procedure for making such applications and standards that will be used by WPB in granting authorizations. No expansion of the current over-all production program (Schedule B, for the year ending June 30, 1945) is contemplated and approval for extra manufacture will be given only for items in which production is lagging behind approved schedules, Farm Machinery Division officials said. The direction serves merely to clarify present procedures, they pointed out.

Applications should be filed by letter in local WPB field offices, with a separate letter for each item. Information covering the following points is required:

1. What quantity of the item does the producer wish to make in addition to his authorized quota?
2. If the item has not previously been made in the plant, are adequate facilities and manpower available? If the item has been made, is the plant up to schedule?
3. Can quantities for which production authorization is sought be made in time for seasonal use by farmers before June 30, 1945, without interference with the plant's other production?
4. If malleable or gray iron cast-

ings are needed to make the item, will the producer be able to get them on an AA-2 rating? Give source of supply, including alternate sources, if any.

In considering applications for authorization to make additional items, WPB will give small plants first consideration, the agency said. In general, a small plant is one with 100 or fewer workers; on the West Coast, 50 or fewer workers.

## Package Homes Project Developed by Rubber Plant

### Akron, Ohio

• • • Goodyear Tire & Rubber Co. has emphasized its intentions of moving into the postwar field of pre-assembled house manufacturing by appointing its first distributor for "Wingfoot Homes, Inc." The distributor is the Standard Equipment Co., Phoenix, Ariz., affiliated with Dorris-Heyman Co., large retail furniture outlet in Phoenix.

Goodyear is now producing an initial allocation of 100 Wingfoot homes in a pilot plant at Litchfield Park, Ariz., designed to house workers from essential industries in that area.

These homes are delivered entirely assembled. Wings or bays at the end of the house may be telescoped to permit moving on the open highway. Extended, the house is 15 ft. wide and 26 ft. long.

The home will be sold in most instances as a complete package, including most of the furniture. It may be financed much like an automobile, with moderate down payment and monthly installments. It may be moved easily on truck, trailer or railroad car, and its freedom of movement is expected to produce a substantial resale value for it.

## Reusable Products Committee Formed To Aid Price Group

### Washington

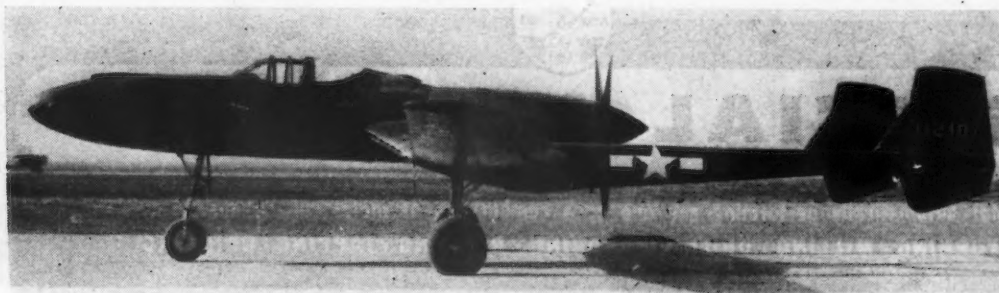
• • • Appointment of a 15-man Reusable Iron and Steel Products Industry Advisory Committee has been announced by OPA. The committee, the price agency said, will consult with OPA on a pending revision of pricing of reusable products. Ceiling prices will be re-examined in the light of present-day conditions, and such changes will be made as may be required to bring them into a more proper relationship with ceilings for new products.

Reusable steel products currently are priced under Maximum Price Regulation 310—Reusable Steel Shapes and Plates, Shafting, and also in Revised Price Schedule 49—Resale of Iron and Steel Products.

Members of the committee are:

Julius Caplan, Caplan Iron & Steel Co., Jeannette, Pa.; Max Clairfield, Sampson Machinery & Supply Co., Inc., Houston, Tex.; Lester M. Finkelstein, Finkelstein Supply Co., Los Angeles, Cal.; Nathan Goldstein, Long Island Structural Steel Co., New York; Norman Gordon, Clonick Steel Co., Chicago; Henry D. Israel, Israel Bros., Dayton, Ohio; Harry B. Keisler, DuLien Steel Products, Inc., Seattle, Wash.; Jay Lenick, E. Lenick & Co., Saginaw, Mich.; C. A. Rand, Brown Strauss Corp., Kansas City; J. S. Rose, Cleveland Wrecking Co., Philadelphia; Max Grimes, Morse Bro. Machinery Co., Denver; Daniel Hill, Northwestern Iron & Metal Co., Lincoln, Neb.; Leon Steinberg, Charleston Steel & Metal Co., Charleston, S. C.; Oscar Sterman, American Building Wrecking Co., Cambridge, Mass.; J. R. Watt, Tulsa Iron & Metal Co., Tulsa, Okla.

**ALL MAGNESIUM EXPERIMENT:** *The XP-54, built by Vultee for the Army was constructed almost entirely of magnesium. Official Army description of the performance of the craft was "fairly normal." It is powered by a Lycoming engine.*



NOW... RESISTANCE WELDING WITH AN

# evenly balanced three-phase load...

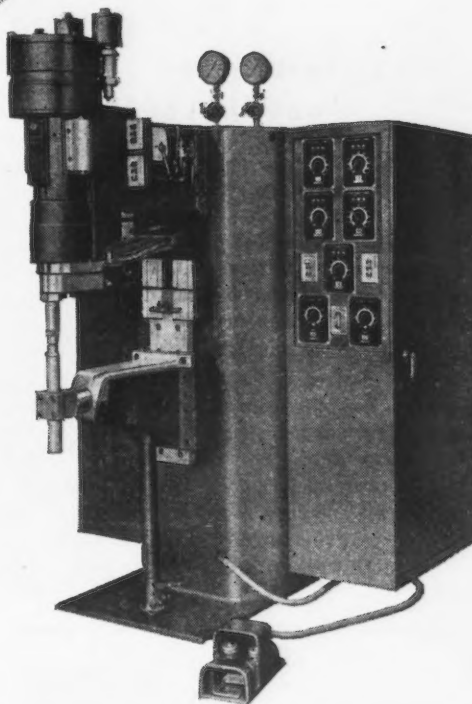


**"THREE-PHASE"**

Resistance welding steel in heavy gauges places a high, periodic demand on the power supply. Conventional a.c. welders — designed for single phase — seriously unbalance the load, cause flicker in the line and often require expensive substation and distribution equipment.

Sciaky "THREE-PHASE" welders employ a principle enabling them to take practically an equal amount of current from each phase of the power supply, thus operating on a *balanced load*. An ideal low frequency welding current is produced first by converting to d.c. then reconverting to an alternating impulse. This system also provides operation at high power factor (80 to 85%) and decreased actual power demand.

*The Sciaky "THREE-PHASE" Welder illustrated is designed for high quality spot welding on mild and stainless steels and rusty and scaly stock in thicknesses from .032" to .312". Rating is 100 KVA at 50% duty cycle, operating at 85% power factor. Speed on two thicknesses of .062" mild steel is 90 spots per minute. Special features include Variable Pressure with a maximum pressure of 5,000 lbs., and adjustable Preheating Current.*



Write for bulletin 204-A describing fully the principle of the Sciaky "THREE-PHASE".

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In England: Sciaky Electric Welding Machines, Ltd., London

In France: Sciaky S. A., 13, 15 Rue Charles Fournier, Paris



## Farm Machinery Output In Last Half of 1944 Showed Little Gain

### Washington

• • • Production of farm machinery for the last half of 1944 showed little improvement over that for the four months from July 1 to Oct. 31, WPB officials reported at a recent meeting of the Farm Machinery and Equipment Industry Advisory Committee.

Production exclusive of wheel tractors, repair parts and attachments for the six-month period was 22.9 per cent behind the scheduled program for this period, as compared with a 25 per cent lag for the four-month period ended Oct. 31, the committee was informed. It was further stated that the production of wheel-type tractors

is close to schedule, and it is expected that this program will be substantially achieved.

Failure to meet programmed schedules was attributed to manpower shortages and difficulty in obtaining certain components, particularly malleable and grey iron castings, which are required for urgent military programs. Since no appreciable improvement in factors that are retarding production can be foreseen, production for the entire year, ending June 30, 1945, will probably be considerably less than the scheduled program, Farm Machinery Division officials said. Some committee members reported their production closer to schedule than the over-all figures indicated. Others, however, reported that they expect increasing difficulty in recruiting manpower.

## 1944 Strike Idleness Two-Thirds of 1943

### Washington

• • • Preliminary estimates of the Bureau of Labor Statistics indicate 280 strikes and lockouts beginning last December, with 85,000 workers involved, and 380,000 man-days of idleness, equivalent to 0.05 per cent of the available working time.

These figures cover work stoppages due to disputes connected with the terms and conditions of employment, regardless of whether workers or employers initiated them. The figures include all known work stoppages due to industrial disputes which involved six or more workers and lasted as long

as a full day or shift. Included also are all workers in any plant who were made idle because of a strike or lockout in that plant, regardless of whether or not they were all directly involved in the dispute.

Preliminary estimates for the entire year 1944 indicate approximately 5000 strikes and lockouts, with 2,100,000 workers involved, and 8,500,000 man-days of idleness. The idleness in 1944 was about two-thirds as great as in 1943 although the number of stoppages and the number of workers involved were greater. Idleness during strikes and lockouts in 1944 amounted to 0.10 per cent of the available working time as compared with 0.15 per cent in 1943, 0.05 per cent in 1942 and 0.32 per cent in 1941.

Month	Strikes and lockouts beginning in month		Man-days idle in month	
	Number	Workers Involved	Number	Per cent of available working time
December 1944*	280	85,000	380,000	0.05
November 1944*	375	200,000	710,000	.10
December 1943...	355	263,240	787,080	.11
December 1942...	147	59,269	192,502	.03
December 1941...	143	29,555	476,471	.07
December 1940...	147	42,615	458,314	.08
December 1939...	106	12,350	384,261	.07

\* Preliminary estimates.

## Urges Retention Of Voluntary Exchange Of Technical Information

### New York

• • • Voluntary exchange of technical information, generally practiced as a part of the war effort, should be continued after the war to promote technological progress and jobs, according to R. J. Dearborn, president, Texaco Development Corp., who recently accepted chairmanship of the NAM Committee on Patents for 1945.

"Many wartime practices are unsuited to peacetime application, but the exchange of technical data and information, desirable in time of war, is also desirable in time of peace, and industry should be encouraged to proceed with such arrangements," said Mr. Dearborn.

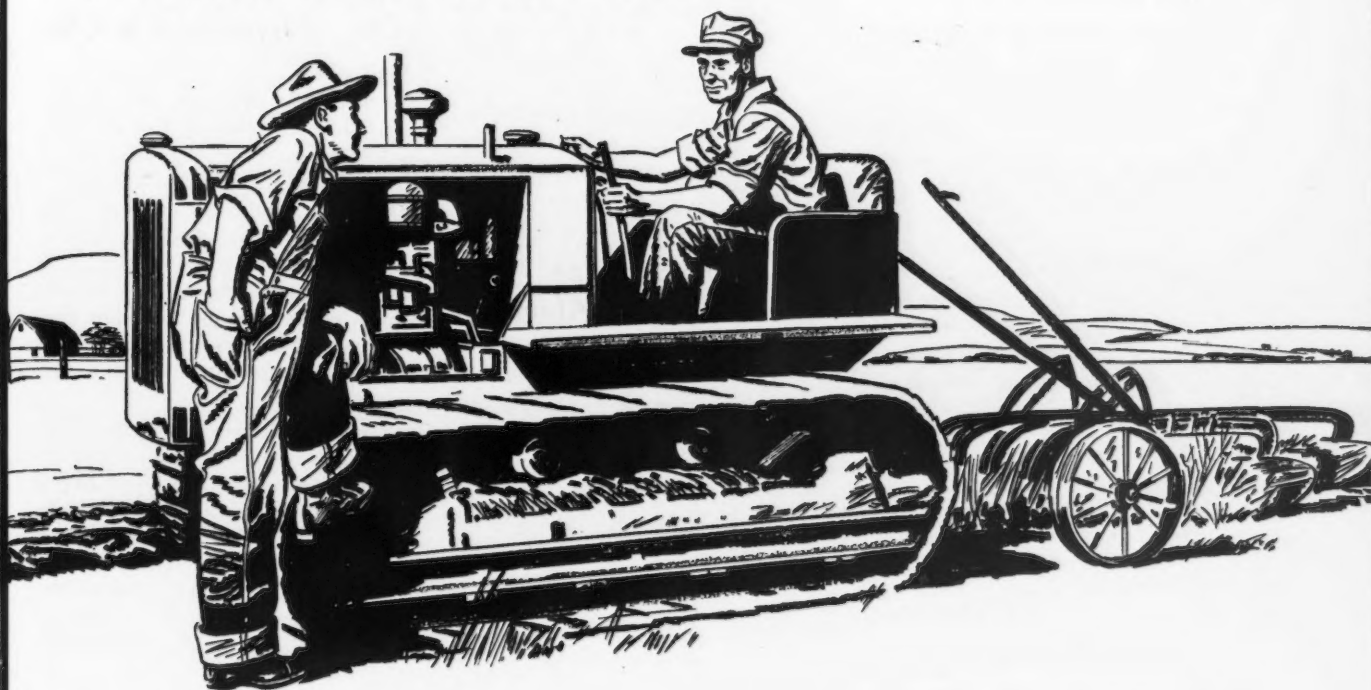
"Patents properly granted to cover technological improvements provide the necessary safeguards to enable exchange of technical data and information between inventors in the same art," he continued. "The tremendous value of such exchanges has been demonstrated during recent months in the extremely rapid development and perfection of processes for the production of synthetic rubber by an exchange of information among all those who have done any creative work in the field.

"The recent U. S. Supreme Court decision in the glass industry case is an important step toward clarification of what companies may or may not do with their patents. It has admirably demonstrated that patent owners have no more right than others to form combinations to suppress competition or restrain trade. On the other hand, the opinion has dealt what I hope is a death blow to the idea that our patent system provides for the compulsory sharing of inventions."

Mr. Dearborn stated that as chairman of the NAM Committee on Patents he will advocate a program of constructive patent legislation, developed by the Association after obtaining the recommendations for improvements in the American Patent System from hundreds of manufacturers, inventors, patent lawyers and representatives of government.

"My own view is that the best patent system is the one which best serves the public interest, and I am convinced that that view is shared by the vast majority of American manufacturers," said Mr. Dearborn.

# "It's Steel!"



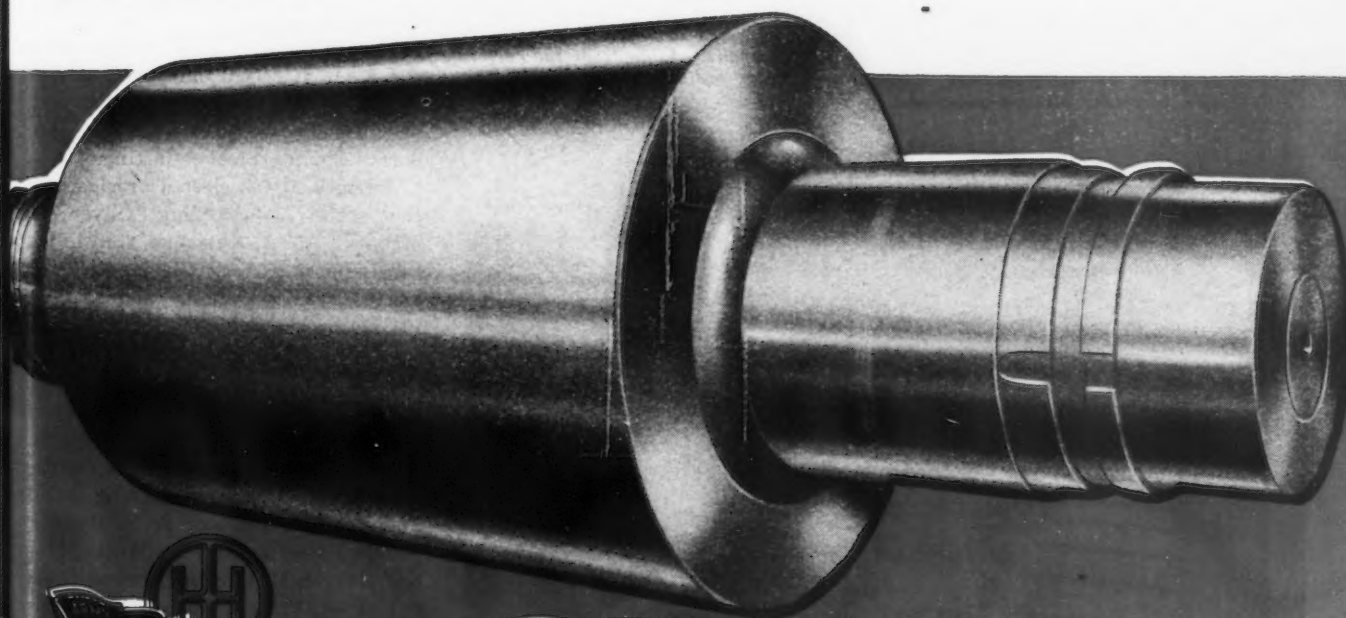
No other words in our language speak so eloquently of strength—endurance—dependability. When you say, "*It's steel!*" you say it all.

That's why millions will demand peacetime products made of steel when this war is over. And the industry must meet these demands with fine steel products quickly produced in abundance.

Ohio Steel can help. First, by continuing to ex-

plore better ways to produce better rolls. Second, by placing our engineering and designing facilities instantly to work on any problem your mill may have. Third, by producing rolls *right* in the shortest possible time.

If, as we believe, "*It's steel!*" will be the slogan of tomorrow's buying millions, you will find these services helpful.



# Ohio Rolls

THE OHIO STEEL FOUNDRY COMPANY

Get from any of these 9 types of Ohio Steel and  
 • Carbon Steel Rolls • Mild Steel Rolls  
 • Alloy "W" Rolls • HOLL-O-CAST Rolls • Chilled  
 • Danco Iron Rolls • Nickel Grain Rolls  
 • Nickel Grain Rolls • Flintuff Rolls

Free literature is the only way to con-



## Magnesium Producers Offer Group Lectures

### New York

• • • Several producers of magnesium, the Hills-McCanna Co., Chicago; Dow Chemical Co., Midland, Mich.; and Revere Copper and Brass Corp., 230 Park Ave., New York, have presented several joint educational programs to describe the production and fabrication of magnesium before engineering, technical and purchasing groups. The programs embrace lecturers, sound film and a display of magnesium products and sand cast parts.

## Lead Wire Sheathing Limited by WPB Order

### Washington

• • • WPB has imposed limitations on the amount of lead that may be used as a protective sheath in the manufacture of insulated copper wire and cable. Under direction 63 to CMP Regulation 1, no producer may use lead as a protective sheath for copper insulated wire or cable except for the following purposes: Fire alarm and traffic control, telephone and telegraph, railway signal, shipboard cable or wire and cable rated at more than 2000 volts.

Furthermore, the amount of lead that a manufacturer may use for such cable is limited during March to 9 per cent of the amount used during 1944 for these products. Beginning April 1, a manufacturer may use during any quarter, 25 per cent of the amount of lead used during 1944 in the manufacture of the permitted products.

## U. S. Contracts For Canadian Aluminum

### Toronto

• • • The U. S. Government has renewed its contract for aluminum with Aluminum Co. of Canada, cancelled last year when stockpiles exceeded requirements. According to Canadian officials there was about 250 million lb. undelivered when the contract was cancelled last year and it is understood that the new order will approximate this tonnage. The new order represents about three months' production at full capacity for Aluminum Co. plants. For some weeks there have been heavy withdrawals of aluminum from U. S. stockpiles at Arvida and other Canadian points.

New developments in fabricating and manufacture of aluminum sheets and other finished products in Canada are underway as a result of the new orders.

## High Grade Bauxite Discovered in China

### New York

• • • Chinese engineers have recently arrived in this country to prepare the way for immediate postwar development of high grade bauxite deposits discovered within the past two years in western China. Located in Kweichow and Yunan provinces, these are the first high grades discovered in China, although deposits of low grade ore have long been known to exist in territory now occupied by the Japanese army.

Sample specimens have indicated an alumina content as high as 70 per cent in some locations. The Kweichow deposit is approximately 8 meters thick, and is found between limestone and coal bed strata. The Yunan deposit, although not as rich as the Kweichow deposit, is said to be in condition to be easily reduced by the Beyer method, whereas the Kweichow ore cannot.

Official estimates of the Yunan reserves, located near Kunming, are approximately 10 million metric tons, while those of Kweichow Province are stated to total about three million metric tons.

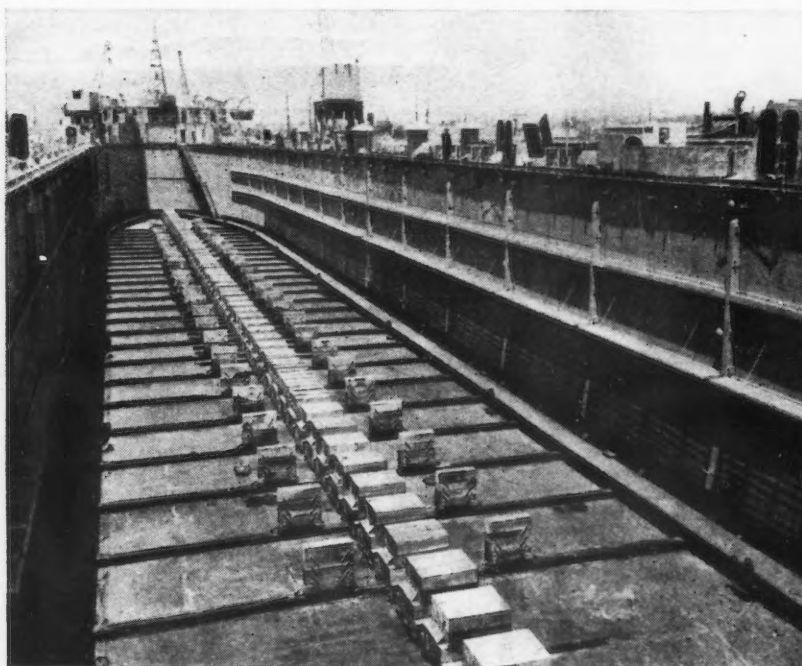
## New Officers Elected To Founders' Society

### New York

• • • At a recent meeting of the board of directors of the Steel Founders' Society of America, A. M. Andorn, Penn Steel Castings Co., Chester, Pa., was elected president of the society, succeeding Oliver E. Mount. A. A. Stroppel, Sawbrook Steel Casting Co., Cincinnati, was elected vice-president, and E. D. Flintermann, Michigan Steel Casting Co., Detroit, was elected a member of the executive committee.

The new board of directors consists of the following: Newlin T. Booth, Deemer Steel Casting Co., New Castle, Del.; C. P. Champlin, Strong Steel Foundry Co., Buffalo; J. S. Wardle, Mobile Pulley & Machine Works, Mobile, Ala.; J. M. Lloyd, American Steel Foundries, Verona, Pa.; A. A. Stroppel, Sawbrook Steel Castings Co., Cincinnati; E. D. Flintermann, Michigan Steel Casting Co., Detroit; C. A. Binder, St. Louis Steel Casting Co., St. Louis, Mo.; E. C. Hummel, Utility Electric Steel Foundry, Los Angeles.

**FLOATING REPAIR BASE:** Operating in sheltered waters where they can moor safely, these drydocks can scoop up a crippled destroyer, pump itself dry and rise to cradle the damaged craft for repairs. Aside from the factor of having no self-propulsion, the craft resembles ordinary vessels from the side, complete with pointed bow.





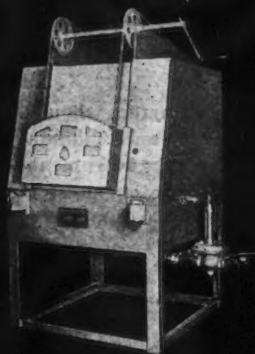


# STEWART

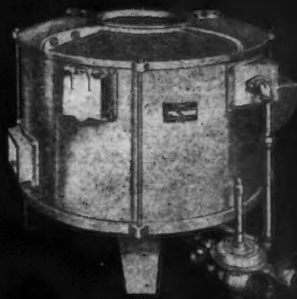
THE BEST INDUSTRIAL FURNACES MADE

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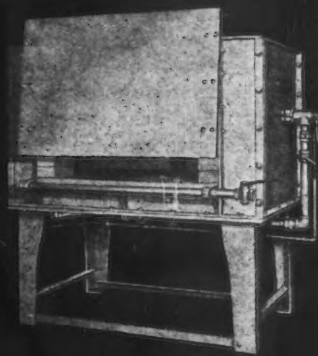
In addition to large units designed to meet specific production requirements, STEWART also builds these famous  
**STANDARD INDUSTRIAL FURNACES**



SEMI-MUFFLE OVEN FURNACE



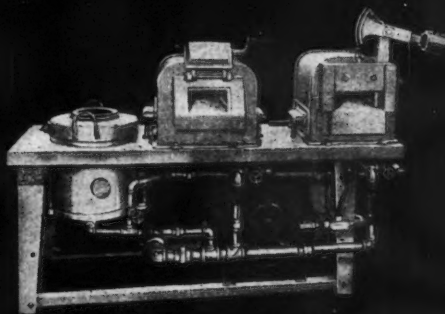
ROUND POT FURNACE



OPEN SLOT FORGE



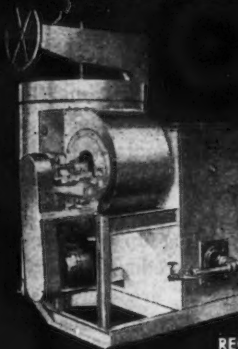
STATIONARY METAL  
MELTING FURNACE



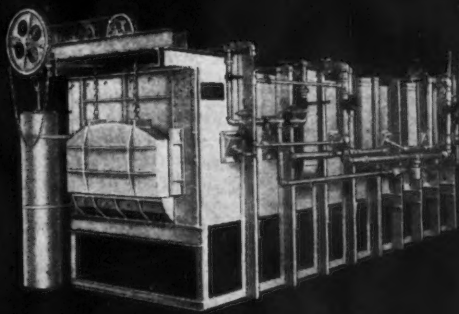
TRIPLE PURPOSE COMBINATION



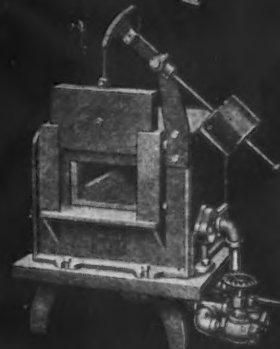
SMALL  
FORGE



AIR DRAW  
RECIRCULATING  
FURNACE



HEAVY PORTABLE OVEN FURNACE



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## Government Policies Seen as Crux in Any Rail Improvement Plan

### Chicago

• • • Informed public opinion upon which can be built sound transportation policies is the key to better transportation for the American people, Gustav Metzman, president, New York Central, told an audience of railway and railway supply men at the Western Railway Club here recently.

Mr. Metzman observed that not only have the railroads done a good job during the war; they have also given the public the facts about their performance, with the result that people generally give the railroads credit for a good war job and for doing their best, despite wartime exigencies. He urged that American railroad men also give the people the facts to inform them about their stake in the better transportation peace will bring.

"There is no sound reason," he said, "why there should not be a great railroad improvement program after the war." "This program," he added, "would spread employment and prosperity and help to solve America's No. 1 postwar problem—jobs. But there is a big question: Will Government policies permit this improvement program to materialize, by encouraging the flow of private capital funds into railroads, or will they discourage that flow and dry it up?"

Mr. Metzman urged "self-supporting transportation" as the keynote for the Government policy that will encourage the flow of private capital into transportation, consistent with

the American enterprise system.

"Our country's interest will be served by policies that give the investors in transportation facilities a chance to earn a modest profit and get their money back—whether they are investing private funds or paying taxes which become Government investments. If our Government-owned transport plant—our super highways, our waterways and our airports—were made really self-supporting, these developments could be made free from appropriations and from politics.

"A policy of self-supporting transportation protects the American citizen against the loss of his private investment in private transportation and against the wasteful loss of his tax dollars invested in public transportation. Then, private investment in the railways can live alongside of Government investment in other forms of competitive transportation."

Directly, or indirectly, the whole American people have a stake in the railroads' welfare, according to Mr. Metzman. "The railroads are of direct interest to investors and savers; they contribute heavily to the support of Government and share the taxpayer's burdens; they are purchasers on a huge scale of equipment, materials and supplies; the railroads provide jobs for labor; and the shippers and travelers of the country cannot get along without railroads."

Telling people the facts about railroads, so that they will understand their interest in them, is a responsibility of the railroad man, said Mr. Metzman.

"Every problem we have in this railroad industry is really two prob-

lems. First, the problem itself and second, the job of telling the American people, with honest facts and straight reasoning, about it.

"I am firmly convinced that what is best for the American people is also best for the railway industry. Our policies deserve to succeed, only if and to the extent that they serve the Nation's best interest. This is something to keep before us, when we are forming policies. Then, let us show the American people that our policies will serve their best interest."

## Eric Johnston Urges Advance Planning Of Contract Termination

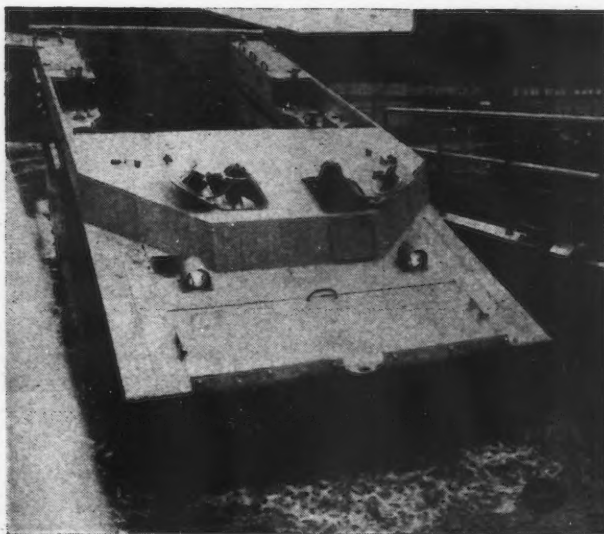
### Washington

• • • War contractors should take the initiative in advance planning for the termination of government contracts, Eric A. Johnston, president of the U. S. Chamber of Commerce, said recently.

Pointing out that the exigencies of war make it necessary to cancel many contracts every day and that sooner or later all of them must be terminated, Mr. Johnston emphasized the gain to both the government and the contractor that results from advance preparation for this eventuality. From the standpoint of the government, advance planning reduces delays in switching from one war contract to another. From the standpoint of the manufacturer, it reduces the time required to clear away inventory, the time that employees might have to be laid off, and the time of plant idleness.

Procedure and personnel to facilitate pre-termination negotiations have been set up and are now available to all contractors. Under present conditions, however, government agencies may not readily take the initiative in urging its use, since the trend is to emphasize prompt and efficient production and to subordinate what might be interpreted as planning for reconversion.

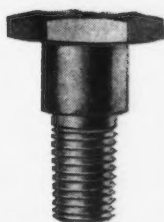
While the speeding up of reconversion to peacetime production may be the end result of pre-termination planning, in thousands of cases it can also save appreciable and highly valuable time in shifting from one war product to another. The imminent shift of the center of gravity of the war from Europe to the Pacific will undoubtedly involve many such changes.



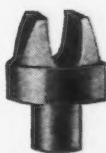
**ALLIGATOR BATH:** Because ice floes in the Detroit River frequently handicapped tests, a steam-heated bathtub has been constructed for Alligator tests at the Graham-Paige Motors plant in Detroit. Test drivers are shown nosing one of the amphibious tanks into the bath, the sides of which are equipped with steam coils to prevent the water from freezing.



Special Round Head  
Shoulder Pin



Special Hex Head  
Shoulder Bolt



Special Pronged Pin

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SPEEDS PRODUCTION

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Here are three special parts used in large quantities (two of them run into millions) by a large manufacturer of automotive equipment. They have both war and peacetime application.

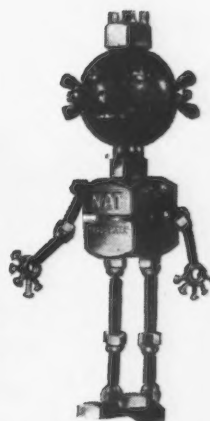
They were originally made milled from bar. When sufficient production could not be obtained by that method, the problem was put up to *National*. We developed an upsetting procedure that met the need for *volume production* and also resulted in substantial *cost reductions*.

You may want to look into the possibilities of saving time and money on fasteners, for present needs or future. Or you may have a problem of fastener improvement on which our engineers can help you as they have many other manufacturers.

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Send for a copy of this case history booklet describing briefly, with diagrams, 15 typical instances of time, materials and money saved. Ask for the "Savings" booklet.



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HEADED AND THREADED  
PRODUCTS

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.



## Proper Understanding Of Government Rules Urged by Metal Group

### Chicago

• • • Sound industrial relations will be aided through all levels of management—from top executives to foremen—by proper understanding of governmental requirements and current technique affecting plant, industry and human relationship, the National Metal Trades Association asserts in a new book on plant management published for use of its 1150 member plants.

The association appraised sound wage policies, salary rating, merit rating, foreman knowledge of responsibilities, and procedures in the re-employment and rehabilitation of veterans.

"These principles are part and parcel of good industrial relations, helping management keep the interest, cooperation and loyalty of its employees," declares Homer E. Sayre, commissioner of the National Metal Trades Association. "To survive in highly competitive fields, a company must depend upon the performance of each employee, and anything that helps improve the performance of the individual also improves the competitive effectiveness of the employer."

A sound wage policy, the book asserts, should be based on two funda-

mentals: The general wage level in a plant should be consistent with the going wage level for comparable jobs in the same community; and the wage rate for each job should be determined relatively with other jobs in the plant, with due regard for differences in skill, experience, effort, responsibility and working conditions.

To make such a policy effective, the publication says, job rating should be applied. It defines this as the process of analyzing each job within a plant to determine the skill and other factors in relation to other jobs in the same plant for the purpose of evaluating that job as a basis for determining wage differentials.

Salary rating is a wider application of the same principle, with salaried occupations being rated on the basis of minimum job requirements. Part of a wage policy also is merit rating, the NMTA publication adds, urging periodical reviews of each individual to maintain fairness and consistency in wage rates.

Merit rating, properly applied, the book declares, will not only provide factors upon which to decide such questions as pay raises, promotions, transfers and the order of priority to be followed in layoffs, "but it will help the foreman toward a better understanding of his employees." For "employee rating is the weighing of individual ability and performance in terms of definite factors, providing a scientific yardstick for measuring the relative efficiency of employees."

## Financial Status Of Tool and Die Industry Analyzed in Report

### New York

• • • The 1936-39 index period normally used by the government in determining the normal profits upon which it bases excess profit places the contract tool and die industry in a difficult financial position to avoid expected postwar recessions. The unusual economic and operating characteristics which have set this industry apart from all others in reacting to business cycles are analyzed for the first time in a study, "The Tool and Die Industry Comes of Age," just published by the National Tool & Die Manufacturers Association, Cleveland, and the Tool & Die Institute, Chicago. It provides this expanded industry of 5000 shops with the background material and statistics necessary for a thorough analysis of operations and recommendations for helping them face postwar problems.

Using the period 1926-29 as 100 in indexing business, the 1936-39 period saw greater sales, but profits before taxes were greatly depressed in comparison with 1926-29. The importance of bringing that information to the attention of the government is stressed.

Despite its comparatively small sales volume, the report states, this highly specialized industry is essential to virtually every implement of war or peace. Without precision cutting tools, dies, gages, jigs and molds, machine tools could not function. It is probably the only industry that exists almost wholly on the sale of special, custom-made products, according to the authors, William R. White Jr., vice-president in charge of production, Midwestern Tool Co., Chicago, and Stuart H. Sinclair, sales manager, Federal Tool Corp., Chicago. While these products make possible mass-production, they cannot be mass-produced.

Extremely busy during the intensive tooling-up periods that precede industry's large-scale production, the special tool and die shops swing a wide pendulum of sharp peaks at the beginning of prosperous periods and then suddenly dip into a deep valley of losses. When the overflow recedes, the industry's own customers become competitors.

The study points out that one of the great needs of the industry is a levelling off of the sudden rises and sharp falls. A method suggested is

**FOR LANDINGS TO COME:** Shown here is the main production line of Higgins Industries for 36-ft. ramp landing boats of the LCVP type. This is the most widely used landing boat in the world. It carries 40 men or 25 men and a jeep or truck.



Safe, labor-saving, time-saving

# Macwhyte Wire Rope Slings

help avoid

production delays!



Here is a husky sling with a strength of 235 tons — yet is exceptionally lightweight for its great strength. Notice the uniformly braided 8-part wire rope body. This gives it extreme flexibility—makes it easy to handle. This sling is a Macwhyte ATLAS 1-in., 8-part, Type 1. It is made to any length requested in strengths from 2 tons to 235 tons.



Contrast this small sling with the large one shown above. This is made to meet a specific need and has a safe-load rating of 2500 lbs. when used at a 60° angle. It weighs only 7 lbs. complete. It is a Macwhyte ATLAS Braided 2-leg bridle sling.

Because they handle difficult loads easily, quickly and safely, Macwhyte Wire Rope Slings help maintain even, uninterrupted production. These custom-built, patented slings are made in the correct size, style and length to meet your needs.

Bring your handling problems to Macwhyte. You will receive prompt, practical cooperation. Macwhyte Sling Engineers will study your problems and help you plan the sling best suited to your requirements.

## Send for Macwhyte Sling Catalog!

This helpful book gives reliable strengths and safe loads of Macwhyte Slings, contains other sling information and pictures. A request on your company letterhead will bring it and other sling literature to you. Mail your request to Macwhyte Company, Kenosha, Wisconsin, or any Macwhyte distributor.

The complete line of Macwhyte slings includes round braided slings, flat braided slings, standard single-part slings, Y-Guard slings, level lift slings, grommets, etc.

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*"Lifting safety to new heights"*

Macwhyte Wire Rope Slings are made to meet the capacity of any crane built.

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Member National  
Safety Council



through the development of more diversified customers whose peak needs would be spread across the months of the year, or the years of business cycles.

The authors conclude by recommending that the same cooperative effort that helped the tool and die industry solve the problems of war production should be brought to bear in meeting the newer demands of peace and to further the continued and sound growth of so vital an industry in the American economy.

Copies may be obtained from George S. Eaton, executive secretary, National Tool & Die Manufacturers Association, 1413 Union Commerce Building, Cleveland 14.

### Screw Machine Firms Hold Last Wartime Meeting on Production

#### Cleveland

• • • Manufacturers of the screw machine products industry held their annual meeting this year at the Schroeder Hotel, Milwaukee, Wis.

Primary problems discussed with the manufacturers by government speakers included the ammunition program which is considered so critical by the General Staff. This part of the program was headed by General R. E. Hardy, Ordnance Division Chief of Ammunition Section, Washington, D. C.

A problem outlined by General Hardy included an increase in component parts of shells, fuzes and boosters that would require 770,000,000 pieces of screw machine products monthly over and above present output. If the industry is successful in accomplishing this schedule, it will boost their production above the peak reached in 1943.

The ammunition program will be assisted, at the request of government officials, by participation of the National Screw Machine Products Association which will help determine which companies are in a position to lengthen working shifts or add additional shifts or machines to increase production.

Another problem facing this small business group is the matter of re-pricing of war subcontracts, particularly in connection with companies doing less than \$500,000 worth of business.

Mr. William C. Foster and Lt. Colonel Joseph Tunstead, in charge of

## RECONVERSION TO PEACE-TIME PRODUCTS MADE EASIER .....

### by using **HOLTITE** fastenings

You can change over to post-war production with no fastening worries by adopting HOLTITE as standard practice in every fastening operation. New HOLTITE fasteners, developed and perfected for weapons of war, will lower your assembling time and costs. Our Engineering Department welcomes the opportunity to study fastening problems in your reconversion plans. Let us know the difficulties confronting you and we'll make practical recommendations for their most economical solution.

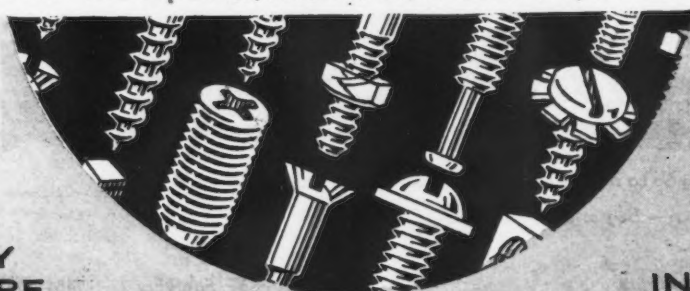
For all present and future fastening needs specify HOLTITE screws, bolts and allied fastenings.

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New Bedford, Massachusetts, U.S.A.

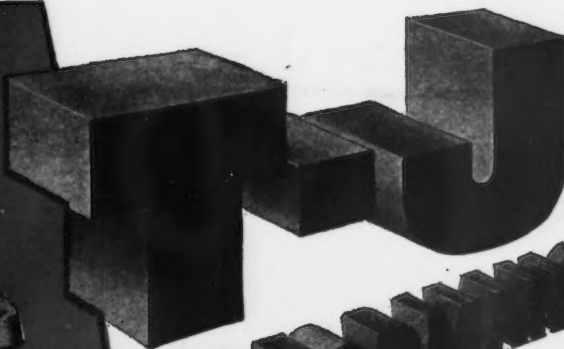


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BONDS

GET  
IN THE  
SCRAP



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● T-J Products have shown outstanding ability to "take it" ... performing tough jobs for industry with unbeatable *accuracy, efficiency and dependability!*

That's why more and more practical production men *specify* T-J where there's a job for Rivitors ... hydraulic cylinders ... or air cylinders ... cutters ... Clinchers ... or air controls. All T-J Products expertly engineered ... precision-built ... rigidly inspected ... right in every respect! Send for latest bulletins. The Tomkins-Johnson Company, Jackson, Michigan.

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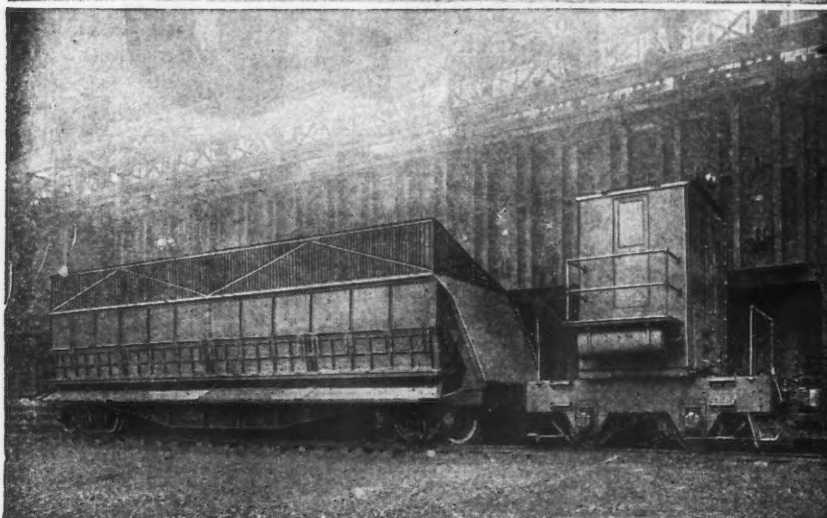
## RIVITORS



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RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

## COKE OVEN EQUIPMENT



## QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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# The ATLAS CAR & MFG. CO.

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repricing for the Purchases Division, Army Service Forces; were the speakers. An open forum followed bringing out the fact that many cases of repricing as applied to smaller companies were possibly unnecessary as being of any particular aid in the war effort; in fact, the companies in attendance expressed the unanimous opinion that both repricing and renegotiation had in no way aided the war effort but that, rather, an extremely stiff tax program was favored by the group so that the manufacturer will definitely know what to expect rather than have to spend a great length of time in individual negotiation of excess profits.

A third government speaker, Mr. Charles G. Beck, in charge of the Veterans Rehabilitation Administration, on an open forum discussed the returning veteran problem from the standpoint of the moral, legal and economic obligations of the employer to the returned veteran.

The meeting closed with a debate between Mr. John R. Cox, newly-elected president of the association, and Mr. Frank P. Fenton, National Director of Organization of the American Federation of Labor. Title of Mr. Cox's speech—"What I Would Do If I Were a Labor Leader." Title of Mr. Fenton's speech—"What I Would Do If I Were an Industrialist."

The 1945 officers of the association are: President, John R. Cox, Balas Collet Mfg. Co., Cleveland, Ohio; Vice-president, Fred C. Phillips, F. C. Phillips Co., Stoughton, Mass.; Treasurer, Scott Osgood, Curtis Screw Co., Buffalo, New York. Orrin B. Werntz, Cleveland, Ohio, was re-elected executive secretary.

The National Screw Machine Products Association was singled out by a committee of judges appointed by the American Trade Association Executives in 1944 for a first-prize award given to the Association by Jesse H. Jones, former Secretary of Commerce and Chairman of the Jury of Awards, for having "rendered outstanding leadership and meritorious services to American industry."

### Shell Forging Plant Opens

• • • A new shell forging plant operated for the government by the Bethlehem Steel Co. as a unit of its Johnstown, Pa., plant went into production here recently. Equipped with piercing presses, drawing benches, furnaces and machining equipment for the production of shell forgings for heavy artillery ammunition, this plant will employ approximately 500 persons.



# 4360

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**EVERLASTING FASTENINGS**

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BECAUSE of these large and varied stocks, Harper is known as "Headquarters for Everlasting Fastenings" . . . "Your Logical Source" of non-ferrous and stainless bolt and nut products.

At Harpers the buyer finds three unique and distinct advantages. First, large stocks of all types of fastenings such as bolts, nuts, screws, washers, rivets and specials; second, fastenings in all the commercial non-ferrous and stainless alloys except aluminum, e.g. brass, copper, naval bronze, silicon

bronze, Monel and stainless steel; third, large stocks of metals in bars, rods, wire, strip and other basic forms from which special fastenings can be quickly made according to specifications.

1945 CATALOG AVAILABLE. New in usefulness to the metal industries. 104 pages, 8 1/2" x 11", 4 colors.

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Why "shortchange" yourself  
by changing disks  
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## Cut time-outs with 3-ply WELDISKS!

Tough! The grit on Weldisks is the toughest, longest-lasting abrasive in commercial use. It's made of electric furnace treated aluminum oxide.

What makes it even tougher and longer-lasting is a unique 3-ply backing: 1 layer of fibre, specially treated and pressed for double strength and hardness, to keep Weldisk edges from going "flabby"; 2 layers of heavy cloth, encasing the fibre, to keep the fibre from cracking when bent.

No wonder Weldisks cut faster and longer! No wonder they're safer, more economical to use. Use them yourself on all tough grinding jobs—the tougher the better with Weldisks! Available in all grits 320 to 16.



# Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS • MAKERS OF JEWEL COATED ABRASIVES

## Small Plants Swing Into New Contract Programs for War

### Cleveland

• • • Smaller war plants in the Cleveland region, comprising Ohio, West Virginia, Kentucky and western Pennsylvania, were assisted in receiving a record number of 691 contracts aggregating \$62,435,974 for January, representing an increase of \$28,393,680 or 83 per cent over that of December.

According to Daniel B. Ford, regional director of the SWPC, subcontracting showed the largest total since the inception of the corporation, with January volume exceeding \$15,000,000 despite the handicap of inclement weather during that time.

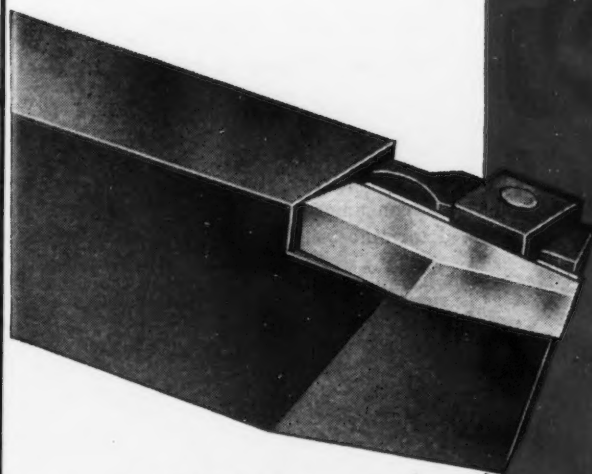
Ohio led the region with \$39,626,700 and of all districts, Cleveland was in front with a total of \$15,148,370. Other figures released by Mr. Ford showed western Pennsylvania second in the region with a total of \$13,371,005; Kentucky was third with \$8,734,044 and the West Virginia aggregate was \$705,220.

Small plants have swung definitely in the national picture to meet the 1945 production schedule and the increase can be taken as an indication of the greater emphasis on urgent war materiel in contrast to the October period when many small plants sought postwar products for manufacture.

An analysis of placements for January shows that Army Ordnance led in purchases with prime contracts amounting to \$19,811,586; next in order was the Chemical Warfare Service and the Engineers.

The following table shows the number of contracts, both prime and subcontract, as well as the dollar totals placed by the Armed Services in small plants in the various districts:

		Prime contracts		Subcontract
Canton	18	\$1,635,907	80	\$675,200
Charleston	8	293,287	12	411,500
Cincinnati	57	10,386,163	15	190,500
Cleveland	59	12,697,884	46	2,463,400
Columbus	27	1,535,712	21	940,900
Dayton	26	4,602,766	28	2,703,900
Erie	15	1,998,641	36	583,400
Lima	32	1,722,857	3	84,400
Louisville	37	8,522,923	2	211,100
Pittsburgh	26	3,656,201	143	7,122,600
Totals	305	\$47,034,341	386	\$15,402,500



STYLE 12 HD  
(OPPOSITE HAND-STYLE 11 HD)

# Introducing — KENNAMETAL "HD" TOOLS

WITH CLAMPED-IN,  
ADVANCEABLE  
KENNAMETAL TIPS

## "HD" TIPS ARE STRONG

Tip is firmly supported—underside is diamond ground, and rests on plane surface of recess which is finished true with Kennametal Milling Cutter or End File. Thermally strain-free assembly also helps prevent tip breakage.

TIP WHEN NEW

## MAJOR PART OF TIP USED

When dull, tip can be advanced, and resharpened time and again, until the major part of it has been used.



## ECONOMICAL REGRINDING

Only the tip is reground—no shank steel is removed. Operation is fast—clogging of diamond wheel grinder with steel is prevented.

## STREAMLINED DESIGN

Smooth, unimpeded chip flow assured by improved clamping arrangement, correctly positioned. HD design employs pressures set up in cutting as factors to help hold tip in place.

## FEWER TOOLS REQUIRED

ONE SHANK  
SERVES FOR  
THE LIFE OF  
MANY TIPS

Many tips can be used during the life of a shank, and tip of suitable Kennametal composition can be used for each job.

for **HEAVY-DUTY** Machining  
on Steel and Cast Iron

Kennametal HD Clamped-On Tools make practicable high rate carbide machining on heavy steel forgings, castings, and bar stock, and cast iron, because the strength of the special HD tips and the perfected design of the tool enable deep cuts and heavy feeds to be taken at intermediate speeds, with amazing tool life.

HD Tools are now available in two styles—11HD and 12HD—for heavy duty turning and boring operations, with special HD tips in Grade KM for general steel cutting, Grade K2S for machining very rough or scaly steel castings, and Grade K6 for cutting cast iron. Larger sizes, i.e., with shanks 1" to 2" wide, are now being produced.

Catalog information, and prices, will be sent immediately upon request.



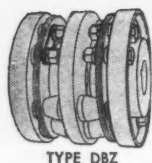
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SUPERIOR CEMENTED CARBIDES

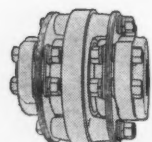
KENNAMETAL Inc., LATROBE, PA.

# THOMAS

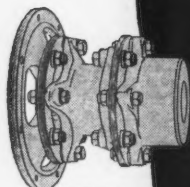
*Flexible* **COUPLINGS**  
FOR *any* SPEED OR SERVICE



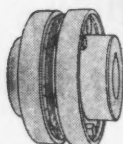
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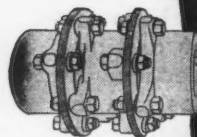
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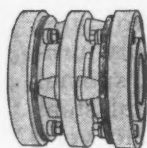
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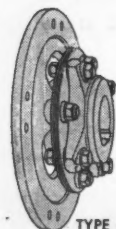
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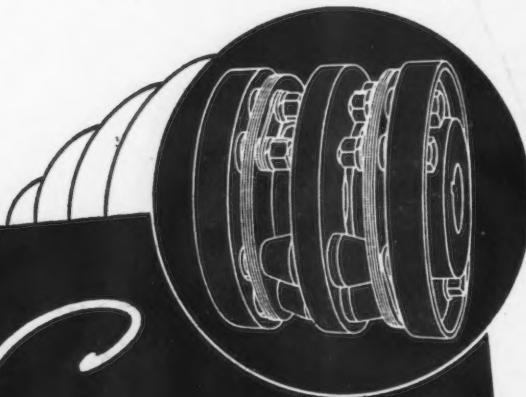
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TYPE MT



TYPE SS

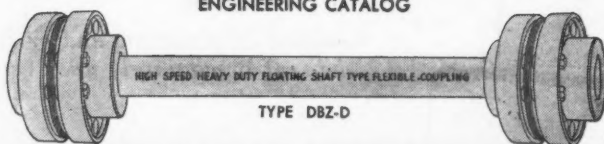


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**BACKLASH, FRICTION,  
WEAR AND CROSS-PULL**  
.....the 4 destructive evils found in  
all other types and makes of couplings.

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NO WEAR  
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NO THRUST  
FREE END FLOAT**

These are the five essential features of  
Thomas Flexible Couplings that insure  
a permanent care-free installation.

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WARREN, PENNSYLVANIA

## NEWS OF INDUSTRY

### Steel Buyers Dictate Volume and Character Of Steel Production

#### New York

••• It is not the steel maker but the consumer who, in the last analysis, determines the volume and the character of steel production, Walter S. Tower, president, American Iron & Steel Institute, told The Association of Customers' Brokers here recently. Influencing the consumer's decision are such things as personal preferences, weather and the current state of his mind and pocketbook, he said. Over none of those can the



Walter S. Tower

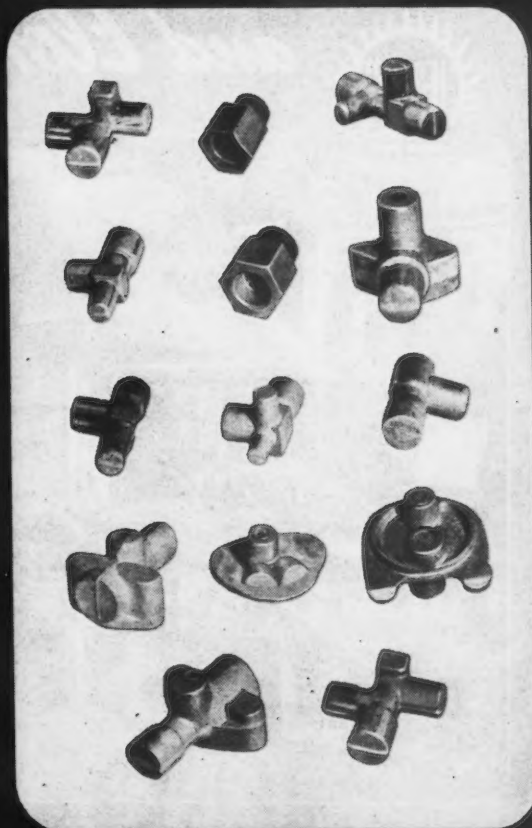
head of a steel company exert much, if any, influence. He continued:

"One thing, however, which the steel industry can do to influence favorably the use of its products is to offer steels of ever higher quality and of broadened usefulness. And steel companies were doing that before the war. During the war, of course, research into the manufacture and treatment of steel has been for the purpose of improving the quality and performance of war materials. An important part of that research, however, seems destined to find its way into peacetime applications for steel.

"Recently I asked three or four technical men to speculate on the possible, as well as probable, new uses for steel which might develop after World War II. I asked them to disregard for once the engineer's ingrained reluctance to go beyond established facts and conditions and to give their imaginations full play as to what new uses might be found in the postwar world for the products the steel industry will be prepared to produce. I am not going into all the lines of their speculations, because some of them lie too close to the nebulous realm of pure theory. But some of their answers to my questions may be of help to you in evaluating future prospects for steel as a metal. I frankly admit my own surprise at some of their speculations, and I give you a sample or two for what they are—intelligent,



# A BETTER WAY IS HERE TO STAY



★ In the world of tomorrow hundreds of materials, processes and production methods developed and proven so advantageous to meet the gargantuan demands of this war, will be used extensively and most profitably in an era of peace.

Among those production methods which have been greatly used and thoroughly proven is the Press Forging at high rates of production, of ferrous and non-ferrous

hydraulic fittings where castings would formerly serve. The factors of greater production speed, superior reliability, increased strength, less waste of material cleaner surfaces, more accurate dimensions and better utilization of man power which

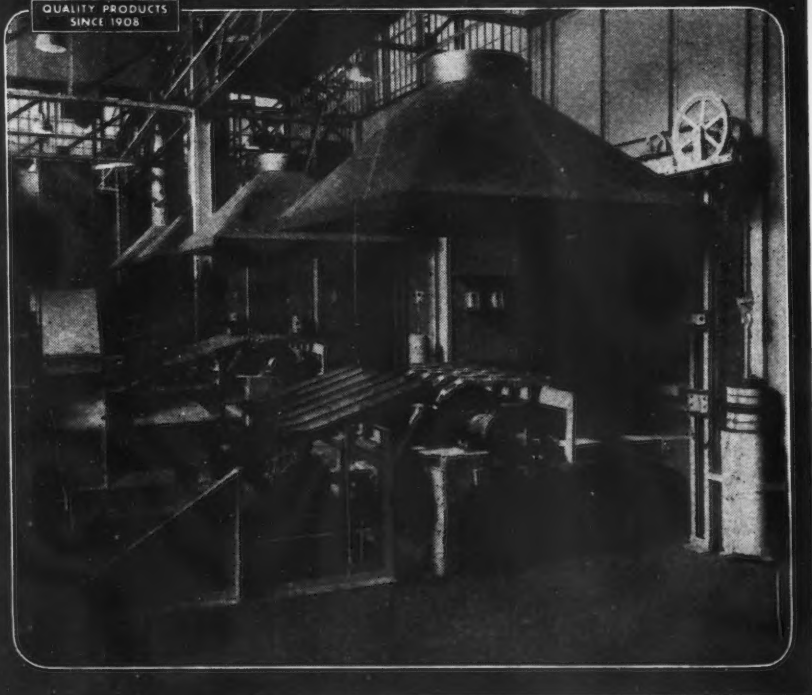
called for press forging of fittings for war, will be the production advantages so vital in the competitive peacetime economy to come.

WRITE FOR BULLETIN No. 75

THE  
**AJAX**  
MANUFACTURING  
COMPANY

EUCLID BRANCH P. O., CLEVELAND 17, OHIO  
621 MARQUETTE BUILDING • CHICAGO 3, ILLINOIS

# Artillery Shells Produced with *Uniform Ductility and Elongation*



*Illustration:* Discharge ends of convection type draw furnaces where the heat treatment of heavy artillery shells is completed after the shells are hardened and quenched.

The continuous furnace is a production line machine which not only eliminates costly materials handling, but lends itself to accurate temperature control as well. Uniform physical properties are obtained in the process. Ductility and elongation are held to specified limits.

Continuous automatic operation throughout each of the four complete units requires a minimum of manpower.

For low-cost and efficient production with better metallurgical results, you can depend upon the designing ability of R-S Engineers.

## R-S Furnaces of Distinction

FURNACE DIVISION  
R-S PRODUCTS CORPORATION

4524 Germantown Avenue • Philadelphia 44, Pa.

BUY WAR BONDS

informed guesses based in varying degree upon metallurgical facts.

"Probably the most spectacular new product which these men consider possible is stainless steel hosiery. They point out that already some steel companies are producing stainless steel wire in diameter comparable to that of the threads used in silk or nylon hosiery.

"Less fantastic but more significant are the developments which actually are under way in the field of steels that resist high temperatures and high pressures. For years there has been a free and strong rivalry between metallurgists and designing engineers in the race towards best utilization of metals, particularly steel. There have been times when the metallurgists led in that race—when they produced steels which could do more than designing engineers were then in a position to utilize. Recently, the engineers were on top in so far as developing designs—particularly for aircraft engines—which call for steels to resist higher temperatures and pressures than have ever before been needed in such applications. It was up to the metallurgists to provide such steels—and they are providing them.

"Because these steels are better able to resist heat and pressure than any steels heretofore produced, they provide opportunities to cut down the weight of the parts for which they are specified. That weight-saving feature results in improved performance of important items of military equipment. Looking ahead a few years, the commercial use of steel parts at hitherto unattainable pressures and temperatures should permit further improvements of engines and constructional materials for automobiles, trains, aircraft and ships.

Much has recently been said or written concerning the competition which steel will face from plastics in the postwar world. On the other hand, little has been written on the role which plastics may play in expanding the use of steel—yet that is a development which is already underway. For four years, plastics that resist heat and corrosion have been successfully and economically used as a coating and lining for steel pipe and tubes. These steel and plastic combinations are already rendering excellent service as boiler tubes and in vital parts of machinery for the manufacture of pulp and paper, essential oils, rayon and a number of other products.

"As plastics are improved and more





## Air-Conditioned Music

The air-conditioning system in the home of tomorrow could be designed to bring radio programs as well as fresh air into every room. Unquestionably we will shortly see many other new things that will make living more comfortable—more leisurely—more pleasurable. We will see a wider use of aluminum and magnesium alloys in the products we use daily. For more than 25 years the Bohn organization has specialized in engineering these light alloys that are now attaining such wide acceptance. When the time comes, we will be glad to help solve manufacturing and selling problems for those to whom these light alloys can supply the all-important answer.

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 GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN  
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 ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

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FOR THE  
BIG JOBS**



## LIFT THAT LOAD AS A UNIT . . . AT LESS COST!

Consider your own handling problems. Are your heavy or bulky materials being lifted, loaded, tiered or unloaded by hand—piece by piece? . . . or perhaps by methods limited to certain fixed positions? If so, here is an opportunity to make a drastic reduction in overhead expense. With Ross Heavy Duty Lift-Trucks, materials are handled in unit-loads at costs which defy comparison. Several sizes and capacities to choose from. Write today for Bulletin 1-25.

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### NEWS OF INDUSTRY

useful types are developed, they will, of course, find wider applications. No doubt, some of them will replace steel products for certain types of service. It has been predicted, however, that plastics will help to sell more steel products than they will replace.

"It is estimated that the wartime quadrupling of capacity of the plastic industry has brought this country's total plastic capacity up to about 10 per cent of the capacity of the steel industry. Yet if only 10 per cent of the steel pipe produced today were lined with the appropriate types of plastic for the various service conditions encountered, certain phases of the plastic industry would again have to expand capacity several-fold.

"Any one attempting to appraise the steel markets of tomorrow must take into account the future role of steel as a material for residential construction. While published estimates of a million new homes a year for ten years may be beyond the bounds of actual performance, there is no question that there will be a large volume of new construction after the war. Therefore, whether the amount of steel going into each housing unit is two tons—as was about the average before the war—or whether it will increase to three or four tons is a question of considerable importance both to steel producers and to the servers of the steel industry.

"No matter-of-fact steel man who is familiar with the subject expects to see an all-steel house. A far more likely development will be a house using larger amounts of steel along with several other materials, each chosen because it is the best suited for a particular function. Even then one must not overlook the importance of personal taste and preference, particularly with regard to design and appearance of a house. People being the contrary creatures that they usually are, the fact that a house is properly designed from an engineering and economic point of view may bear little weight with a prospective buyer as against his preference for more conventional designs and constructions.

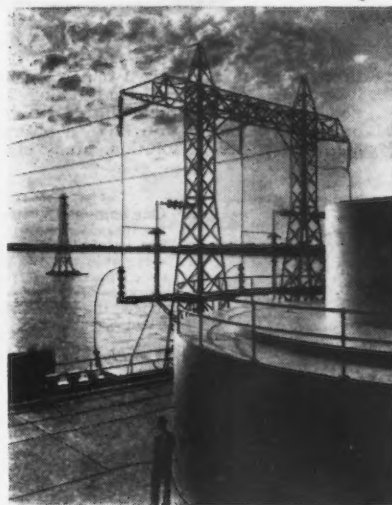
"During the war there have been developed new adhesives and new methods of attaching collateral finishing materials to metal shapes and panels. New protective coatings and treatments have been devised to broaden their use for both structural and ornamental purposes. Furthermore, the light steel structural panels and constructions are ideal for use in radiant heating installations. They

## New Process Makes Welding Desirable

By GEORGE H. OHMER  
Chief Engineer

### Dayton

• • • That the Galv-Weld Process has overcome the greatest drawback to the use and fabrication of galvanized iron and steel, is recognized by foremost producers of mill galvanized sheet and pipe, and hot dip galvanizers. The shipbuilding, railroad, petroleum, air conditioning, electric power, and other industries, are employing Galv-Weld Alloy in ever increasing amount.



POSTWAR ELECTRIC INSTALLATIONS such as this generator at Wheeler Dam will be of welded construction for lower cost and longer life.

The Galv-Weld Process makes it possible, for the first time, to weld galvanized sheets, shapes and pipe and leaves the entire galvanized structure 100% rust and corrosion proof. The process is fast, permanent, requires no flux, produces no fumes, and requires no sand or grit blasting. Structures formerly requiring hot-dip galvanizing after full or partial fabrication may now be constructed from mill galvanized sheets and hot dip shapes. Galvanized piping may also be welded to provide leakproof and rust free construction not previously always attained by the threaded joint. It can be applied in any position and in confined quarters, and its use is economical.

The burning of the galvanized coating during welding, and subsequent rusting of the weld and adjacent area is solved by the Galv-Weld Process. The Galv-Weld Process makes it possible to use hot dip galvanizing on larger structures as the sub-assemblies can be welded together and protected with Galv-Weld Alloy. Manufacturers are invited to submit samples of products for producing examples of how they can be Galv-Welded. There is no cost for this laboratory service.

Complete details may be had by writing Galv-Weld Products, Dayton 10, Ohio.

provide ready made duct-like spaces that can be utilized for wall, ceiling or floor panel heating systems.

"It is considered very possible that some time in the postwar period colored steel will be developed and marketed. Research on the problem of coloring steel throughout its cross section rather than just on its surface is already underway in several quarters. And it has been reported that at least one producer has succeeded in making a stainless steel which is black throughout its cross section. If colorful, corrosion-resistant steel could be developed for manufacture into sheets, it might find a very large market, as in the automobile industry where the problem of painting and re-painting cars would be eliminated.

"Another interesting speculation heads into the field of powder metallurgy—an art already rather well started in so far as non-ferrous metals are concerned. The problem is to develop a steel which will powder readily and weld under pressure. One specialty on the horizon in this field would be the production of powerful magnets made by compressing steel powders. By varying the density of the product, full advantage could be taken of the markedly superior magnetic properties of iron.

"With productive capacities increased several fold, to meet war demands, light metals have been regarded in some quarters as likely to transform many metal working industries, even to the point of offering stiff competition for steel.

"But steel men generally are not seriously concerned on that point. There is still a substantial price margin in favor of steel. The quantity of light metals available is still but a dribble alongside the huge tonnages of steel. And some of the special steels recently developed give greater strength with little added weight. Steel is still the cheapest, most abundant and most versatile of all metals."

### Lower Rustless Profits

Baltimore

• • • In a preliminary report for the year 1944 issued recently by Charles R. Hook, Sr., chairman and president, the Rustless Iron & Steel Corp. showed net sales of \$28,274,753.82 as compared with net sales of \$32,996,894.35 for the year 1943. Net income for 1944 was \$1,831,780.33, after taxes but without provision for renegotiation, as compared with net earnings of \$2,236,492.10 for 1943.

## They have what it takes

• Modern fire power is making our succession of sea victories possible in the Far East and in the last analysis the accuracy and weight of metal thrown tells the story.

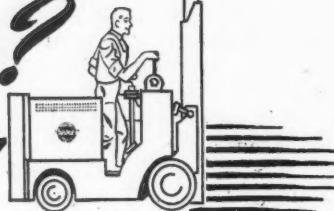
The electrical control of our Navy's guns requires sturdy, well designed springs and as in most precision instruments uniformity of load is an essential. We do a good job of making springs to the most exacting specifications.

Phone Holly 2211  
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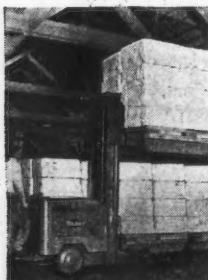


# IS YOUR PROBLEM ONE OF MAINTAINING PRODUCTION WITH LESS *Manpower?*



Proper use of mechanized material handling equipment can help offset manpower losses. Most plants find that a Baker Truck—with a single operator, will release a number of men for other duties. Faster handling of materials speeds production in other ways, too. If you have a manpower problem, the actual case histories below may offer a solution. Many more are reported in the New Baker Catalog.

★ ★ ★ ★ ★



One company writes "With our Baker Truck we increased storage area by stacking, releasing valuable space for production . . . We were able to save the labor of six men and speed movement from receiving platform to storage—saving elevator tie-up . . . we removed the ever-present danger of strains and hernias." (See illustration at left.)

Records show that one of the first ram trucks, introduced by Baker in 1922, realized savings of 35 man hours per carloading for a steel mill. Today ram trucks are standard equipment for handling coiled materials. Illustration at right shows one of a fleet of Baker Trucks in the world's largest, most modern stainless mill.



"Womanpower" has replaced lost manpower and helped maintain production in thousands of plants. Because of their extreme ease of handling, Baker Trucks are ideal for women operators. Illustration at left shows a truck in service at a plant of the world's largest aluminum producer.

A fleet of eight Baker Trucks keeps the plant of a large domestic range manufacturer—now engaged in turning out war goods—at top production. Trucks service machines with materials to keep them running without interruption. Faster movement of parts and products in plant, warehouse and on loading platforms has cut handling costs 75%. (See illustration at right.)



An important factor in maintaining production in a large aircraft plant is the minimizing of "down-time" of large presses. The Baker Die Handling Hy-Lift Truck makes quick work of removing or placing dies in position—and simplifies their storage. (See illustration at left.) This plant also uses Baker Crane Trucks for speeding operations on the assembly line.

The problem of handling efficiently the wide variety of materials at a large chemical manufacturing plant is solved by a fleet of Baker Fork Trucks. (See illustration at right.) In carloading operations alone, on a conservative estimate, one Baker Truck replaces seven men with hand trucks.



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Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

**BAKER INDUSTRIAL TRUCK DIVISION of The Baker-Raulang Company**  
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In Canada: Railway and Power Engineering Corporation, Ltd

# Baker INDUSTRIAL TRUCKS

## Manpower Gains Made But Shortages Exist On Critical Items

### Washington

• • • Despite gains in war plant employment in December and the first part of January, production of critical items, due to manpower shortages, falls far short of meeting immediate demand, Paul V. McNutt, chairman of the War Manpower Commission, declared recently.

"In 1,500 highly important munitions plants reporting, there is an immediate need for about 180,000 workers," he asserted. "Thousands of other plants at the same time report shortages of labor. In many of these the shortages may soon become acute."

War plant employment turned upward in December, 1944, for the first time since November, 1943, Mr. McNutt said. Munitions plants reported an increase of 50,000 workers in December, he added, in contrast to a steady drop of 100,000 per month for the preceding year. The upward trend continued into January.

"The immediate causes of the gains in war plant employment," the WMC Chairman declared, "were the expansion of some of the critical programs which created thousands of new jobs, and the general realization that the war is by no means over. Since January 1 this upward trend has undoubtedly been influenced by statements of manpower needs which have accompanied discussions of manpower legislation."

"At the beginning of the year, before December reports were available," Mr. McNutt continued, "it was estimated that within the first six months of 1945, 700,000 additional workers would be needed for munitions manufacturing and war supporting activities, such as construction, transportation, etc. The filling of 100,000 jobs in December and the first half of January is only the beginning in meeting the 700,000 required in the first half of this year."

The 180,000 war plant workers immediately and urgently required, the Chairman declared, are for the 1,500 plants where production schedules have not been met because of manpower shortages, or threats of shortage. These include heavy duty tires, aircraft, aluminum sheet, several types of ammunition, navy rockets, tanks, and ship repair. Requests also are pending for extended production



programs of heavy duty trucks and several secret programs.

Mr. McNutt pointed out that the need for the 700,000 additional war plant workers is in addition to 900,000 men of military age who will be inducted by June.

To meet the joint demands of war industry and the armed services, Chairman McNutt said, more men and women must be found. There will be, he said, a normal increase of approximately 500,000 in the labor force. It is expected that about 400,000 veterans will be discharged from the armed services, who will return to the civilian labor force. No one can forecast with accuracy, however, he added, how many will go into essential industry. He pointed out that undoubtedly some will return to their old jobs in less essential industry in order to protect their veterans' rights to reemployment. An additional force of 200,000 workers is anticipated from already scheduled curtailed programs.

"In the case of this decline in production of some items," Mr. McNutt asserted, "a part of that force will be automatically transferred to expanding production. Contracts are being awarded on the basis of using the same facilities. There will be, however, numerous cases in which the manpower thus released will not be available for further employment because of the geographical location of the plants in which they are needed, or because of the lack of specific skills on the part of some released workers.

War plant turnover, which was a formidable problem in the early stages of development of the war manpower program, the Chairman declared, has been substantially reduced. Although the actual quit rate is less than a year ago, every effort must be made to further reduce undesirable turnover.

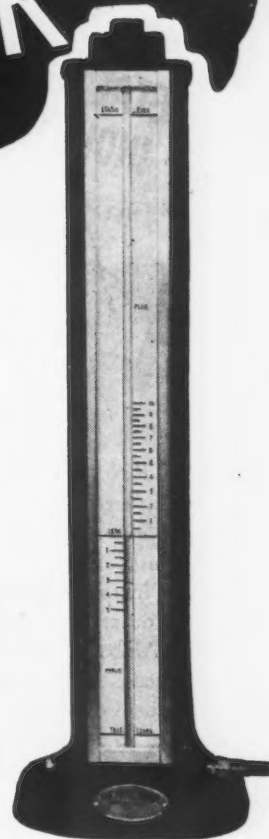
Some of the critical industries immediately in need of workers, Mr. McNutt said, include:

**Aircraft.** Despite an increase of 10.7 per cent in output weight in December, production of "must" types of aircraft is scheduled for 66 per cent increase by June. Manpower needs largely concentrated in six airframe and two engine plants. At least two of these plants are now experiencing staffing difficulties.

**Aluminum Sheet.** Inventories have dropped one-third, necessitating 33 1/3 per cent increased production. Plant facilities available, but recruit-

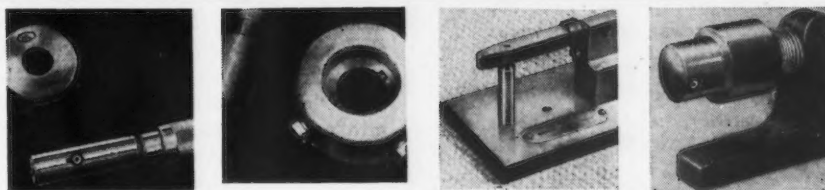


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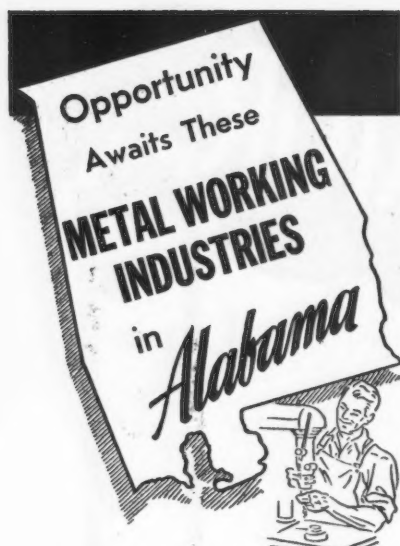
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Specific studies will be made on request to—Dept. I

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Montgomery 5, Alabama

## NEWS OF INDUSTRY

ment of workers difficult because plants are located in labor shortage areas. If the aluminum sheet plants are not manned so that they may operate at capacity during the next several months the production of critically needed aircraft may have to be curtailed.

**Ammunition.** Production schedules in several types being increased. Three of 22 plants loading and assembling ammunition are now having manpower and ten others face serious recruitment problems because of expanding schedules. In addition to the workers needed in the ammunition plants the production of ammunition is being adversely affected by shortage of workers in the brass mills, the lead mines and shell forge shops.

**Navy Rockets.** Lack of component parts in some instances and manpower shortages in others held up production in explosive and loading plants. Further expansions are scheduled. Recruitment may be difficult, as plants are located in labor shortage areas.

**Tanks and Self-Propelled Guns.** Tank production 5 per cent below schedule in December. Lack of manpower not a major factor but expanded schedules announced in December will require intensive recruitment program.

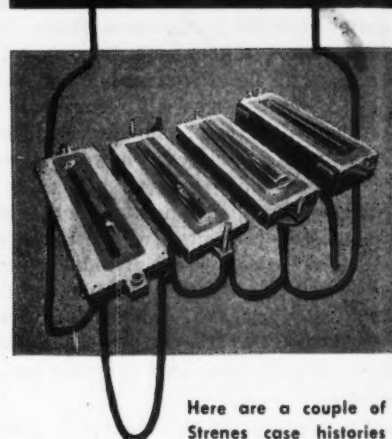
**Heavy Trucks.** Lagging output moved upward in December, but is still substantially below military requirements. Recruitment problems are serious because plants are located in labor shortage areas.

In releasing the figures on the manpower requirements for establishments engaged in "must" production behind schedule because of inadequate labor force, Mr. McNutt emphasized that the figures were from a report submitted January 12, covering the 1,500 "must" plants, and do not take into account changes which have occurred since that date.

### Critical Industries

Industry	Workers Required
Aircraft .....	36,640
Explosives .....	6,303
Ammunition loading and assemb... ..	4,700
Small arms ammunition .....	6,420
Brass mills .....	3,173
Bombs and bomb parts .....	4,055
Army rockets .....	1,534
Navy rockets .....	2,953
Navy high capacity ammunition ... ..	1,120
Artillery ammunition over 105 mm..	3,297
Artillery ammunition 105 mm. ....	1,521
Artillery ammunition under 105 mm.	1,800
Heavy artillery .....	2,637
Foundries .....	7,449
Navy 40 mm. guns .....	629
Shipbuilding and ship repair .....	38,284
Tanks and self propelled guns .....	4,577
Heavy trucks .....	5,901
Wire .....	2,690
Construction .....	6,240
Transportation .....	4,487

## STRENES METAL POINTS THE WAY



Here are a couple of Strenes case histories that may suggest a way to reconvert to civilian production a little faster.

### Tractor Top-Dies

Strenes Metal—cast-to-shape—was specified for stamping tractor hood tops. An accurate cost check showed a saving of around 50% in machining time due to the cast-to-shape construction. On reconversion tooling rush, such a saving will be highly advantageous.

### Hydrator Pan Die

Dies of Strenes Metal stand up, too. One refrigerator hydrator pan die, for instance, stamped 2,000,000 parts with a 3 1/2" draw out of .50 material. And, due to the self-lubricating property of the metal, stoning and polishing operations were virtually unnecessary.

Both for civilian and war products, Strenes Metal has been a definite help on many tooling programs. Facts and figures on request. Write today.

Strenes Metal for drawing and forming dies.

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**Strenes METAL**

## Plans Made to Lease Obsolescent Planes For Airlines Usage

Washington

• • • Establishing a policy for leasing commercially usable transport planes to save airlines the cost of buying ships which will be soon obsolete, the Surplus Property Board has allocated 127 out of 185 medium transports declared surplus to commercial airlines. The value of these ships is said to be more than \$47,000,000, but no deliveries of the planes have been made. SPB spokesmen admit that the dollar return on leasing ships may be low, but say that the board feels that this is the most expedient way for the government to get its money out of the transports. Considerable quantities of urgently needed munitions are now being shipped by air.

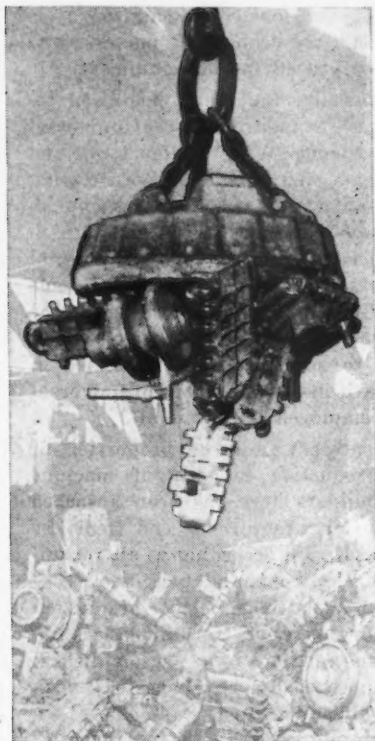
The DPC Aircraft Division, the actual disposal agency, has 1760 light transport planes, valued at \$56,000,000. Of this number, 38 have been sold at a price of \$370,000. About 1500 of these are Cessna NC-78's which SPB says have no commercial use as yet. They will be licensable when it has been proved that they are safe for civilian purposes.

The government has only realized \$1,135,000 out of the sale of approximately half of 3000 light reconnaissance planes valued at \$17,500,000 originally. These are among the most easily sold of all planes declared surplus, as they are the type of plane most frequently sold during peacetime for sportsman flying.

An odd fact about surplus planes declarations has come to light. In December, 6700 planes were produced and 3862 were declared surplus. In January, 6500 planes were made and 3000 were declared surplus. It must be remembered, however, that the planes made in current months are mostly heavy bombers and other heavier types of military ships and those declared surplus are mostly light trainers rendered surplus by curtailment of training programs.

Approximately 19,915 military planes have been declared surplus, the original cost of which was more than \$694,000,000. These are broken down into 2915 combat ships valued at \$322,000,000 and about 17,000 trainers valued at \$372,000,000. Only two of the combat ships have been sold by DPC and these went for \$25,700. Five hundred and forty-six of the trainers were sold for \$725,000.

## STEARNS LIFTING MAGNETS MOVE MATERIAL ECONOMICALLY



SAVE TIME —  
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"We have used a considerable number of magnets in the past 15 years, and at present have 5 of your lifting magnets in our service. These are performing excellent work, and every one of them is doing a better job of lifting than those which we had formerly used."

"As you know, these lifting magnets are used throughout our cleaning room and foundry wherever castings have to be moved and are great time savers as there is no need for chains or chainmen. A crane operator can perform the whole job of moving castings from place to place throughout the plant."

\*Name on application.

You get definite saving of time and labor in moving material inside and outside of your plant with Stearns Lifting Magnets.

And they are dependable! Read what this foundry official has to say. If you want sturdy, low initial and operating cost magnets in all practicable sizes and shapes, consult Stearns Magnetic, Milwaukee 4.

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Separators  
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# MACHINE TOOLS

... News and Market Activities

## Machine Tool Industry Pours Out War Goods But Eyes Surplus Problem

### Cleveland

• • • Essential adjunct to the ascendance of Mars, the machine tool industry now with a colossal production record behind it, has since the start of the war been faced with a demand intermittently desperate. Meeting this demand has meant a number of things: Victory, first, but underneath the countless plaudits that have already been heaped upon an industry that has waged and won the war of production was the sobering reflection that the amassing of a staggering machine tool surplus poised its future on the springboard of a new era.

Probably no branch of the armed forces has been more dependent upon the machine tool industry than the Army Air Forces, whose technical service command has contractors and jobbers alike murmuring praiseworthy phrases in its behalf. Some idea of the liaison between the AAF and machine tool makers here can be had from the following facts.

In 1942, there was an urgent need for approximately 50,000 machine tools in the Cleveland region, bulk of which was required for aircraft frame and engine parts manufacturers in the 31 counties of the region. At that time, Jack & Heintz, Cleveland Fisher Aircraft, Cleveland Graphite Bronze, Thompson Aircraft Products Co., Cleveland Pneumatic Tool, Cleveland Pneumatic Aerol, Weatherhead Co., and the Parker Appliance Co., to name a few, all needed tools and needed them badly.

Then as now, turret lathes made up the bulk of the urgently needed tools, with milling machines and grinders, both external and internal, ranking in that order of importance. Fortunately, the turret lathes made in the Cleveland area were then, and still are, the most critically needed for the tasks at hand.

As the tide of war changed with its commensurate effect on production, an abundance of government-owned machine tools became available for sale, transfer, or lease during most of the last half of 1944. But in November, the new Ordnance program absorbed all of the available machine tools and,

as the machine tool public well knows, resulted in machine tools of all types becoming critical during January and February.

Since early 1942, the trend in this area has been toward the acquisition of a universal tool, and very few single purpose tools are being utilized. And so far as the AAF is concerned, the only branch of industry here that has leaned toward specialized tools has been the crankshaft makers, who obviously need special equipment.

Generally, the trend has been toward the standardization of universal tools among AAF contractors, and where needed, single purpose tooling on the machines which can accomplish the same objective as a single tool, eliminating engineering and special manufacture of single purpose tools for limited jobs. Accordingly, the number of single purpose tools being used to produce AAF materiel in comparison to the number of universal tools employed is very small.

At present, a large proportion of the productive capacity of machine tool builders here has been absorbed in the manufacture of end items by the AAF, and according to air technical service command personnel, conversion from machine tool production to precision parts for airplanes and airplane engines was accomplished, as might easily be suspected, with little difficulty.

Certainly one of the controversial questions of the moment is the expendability of single purpose machine tools. Obviously, single purpose equipment in the hands of a contractor who plans to continue along the same line in the postwar period would be of more benefit to him than universal machinery. An example of this would be the crankshaft industry. Single purpose crankshaft machine tools could easily be converted to the making of crankshafts for private industry.

So far as the equipment employed on AAF contracts in this area is concerned, it has been said that when a machine tool is designed to perform one certain operation on a certain part for a plane or aircraft engine the only

salvageable part would be the electrical, which in some instances is worth more than the machine itself. The universal application of all electrical equipment is well-known and certainly other uses for such equipment can be found and some AAF personnel believe that this class of single purpose equipment should be disassembled, the electrical equipment separated from the machine tool itself and salvaged and the balance sold for scrap.

In an allied vein, Tell Berna, general manager of the National Machine Tool Builders Association, this week told a group of machine tool builders here that "a large volume of relatively new machine tools will be sold at bargain prices after the war."

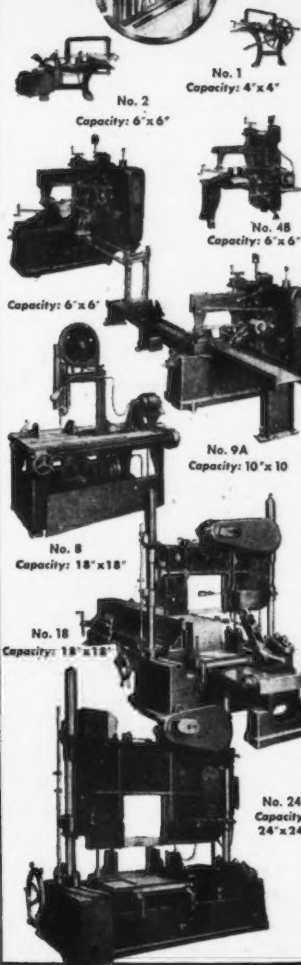
"Machine tool builders," Mr. Berna said, "will have a great opportunity after the war to remove the 635,000 obsolete machines still in use in factories throughout the country, and to replace them with two and three-year-old machines." He predicted that the result will be increased employment, higher wages without increased costs, and better quality products.

## To Tighten Warehouse Controls on Sale of Steel

### Washington

• • • WPB officials told members of the General Steel Warehouse Industry Advisory Committee at a recent meeting that tightening of controls over the sale of steel from warehouse stocks may be expected because of expanding war demands. It was pointed out that WPB approval has already been temporarily suspended on warehouse sales of critical steel products on an "ex-allotment" basis, under Direction 44 to CMP Regulation No. 1.

A sizable increase in warehouse steel inventories, which had been built up in the fourth quarter of 1944, has largely melted away during the last six weeks as a result of heavy war orders, according to J. R. Stuart, chief of the Steel Division Warehouse Branch. He also said that warehouse inventories have been depleted by rail embargoes and by the fact that purchasers had not allowed sufficient lead time when placing mill orders with consequent greater demand on warehouse stocks.



## The MARVEL No. 8 does this job with ease— fast and economically

The Denver Shops of the Denver Rio Grande and Western Railroad, like numerous other railroad shops, have found the No. 8 MARVEL Universal Metal Cutting Band Saw Machine the ideal metal sawing machine. The illustration shows the cutting of floating rod bushings into three equal sections. Normally a difficult and expensive operation, this job is done on a No. 8 MARVEL Band Saw with ease, speedily and economically. No special tools, jigs, or high mechanical skill are required.



In railroad shops, as in many machine shops, tool rooms, and fabricating shops, there is a real need for a UNIVERSAL metal sawing machine that will cut the smallest, most delicate pieces as well as solid blocks 18" x 18". The No. 8 MARVEL Band Saw Machine answers these requirements and in addition will mitre, trim, notch and make re-entrant cuts.

The No. 8 MARVEL Metal Band Sawing Machine is but one machine in the MARVEL system. There is a MARVEL Metal Cutting Saw (either hack saw or band saw) for every shop's need. A local service engineer is available to survey your work without cost or obligation. He will recommend the best saw for your work, supplying accurate cost and production data. Write us asking for a call by a MARVEL sawing expert. A complete catalog is also available.

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# MARVEL SAWS



# NON-FERROUS METALS

... News and Market Activities

## Air Force Procedure For Aluminum Scrap

Wright Field, Ohio

• • • Procedure for the disposition of Army Air Force aluminum scrap is outlined to plant clearance officers and to AAF scrap generating facilities in an instruction sheet prepared by the Air Technical Service Command.

Only if scrap aluminum cannot be disposed of by competitive bidding or negotiated sale at prices equal to or better than those specified in Surplus War Property Administration 5, is it to be shipped to the nearest Metals Reserve Co. aluminum scrap storage yard. But authorization to ship must be obtained from the District Scrap & Salvage Branch, Plant Clearance Section, ATSC. The regulation provides for minimum sales prices per lb. for aluminum scrap as follows: segregated solids, 6c.; mixed solids, 5c.; solids mixed with foreign materials, 4c.; obsolete aircraft or sub-assemblies, 2.5c.; wrecked aircraft, 1.25c.

Metals Reserve Corp.'s aluminum scrap storage yards are located as follows: Philadelphia Ore Docks, Philadelphia; Somerville Depot, Somerville, N. J.; Lake Ontario Ordnance Works, Youngstown, N. Y.; Lawrence Warehouse Co., Chicago; Metals Reserve Co., Flint, Mich.; Camp Forrest, Tullahoma, Tenn.; Camp Phillips, Salina, Kan.; Camp Howze, Gainesville, Tex.; Ft. Lewis, Tacoma, Wash.; Camp Haan, Riverside, Calif.

It is recommended that primary and remelt producers and scrap dealers be invited to bid 30 days before the scrap is to be generated. Grades of aluminum scrap not covered by SWPA Regulation 5 are to be sold to the highest bidder at the point of origin. These grades include all turnings and borings, lots at one location weighing less than 10,000 lb., where less than 10,000 lb. per month is generated, or where the termination claim is less than \$10,000.

## Antimony Ore Supplies

New York

• • • The recent order returning antimony to allocation control has not yet had any effect in increasing supplies available for strategic uses. The government is reported to own large

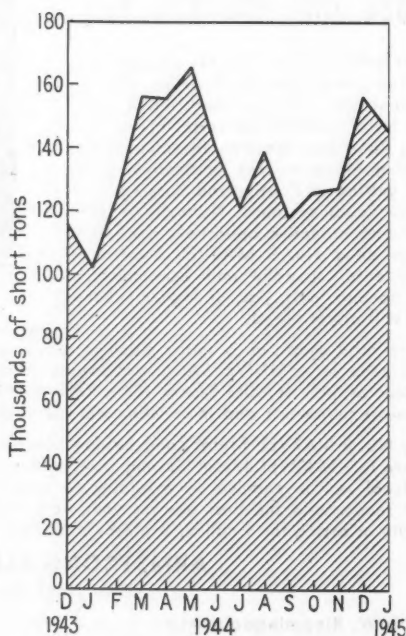
stocks of antimony ore in Peruvian and Chilean ports. However, users of antimony would do their own refining and are said not to have labor adequate to handle this additional work. The Metals Reserve Co. ore, moreover, is not being offered at less than ceiling prices and the current price for antimony metal is somewhat below this.

## Moves to Recover Tin

Washington

• • • WPB has amended Order M-325 governing tinsplate scrap to extend the preparation and collection of used tin cans to all areas of the United States. The amended order requires all refuse collectors to collect segregated and prepared used tin cans and deliver them.

After May 1, no person who generates tinsplate scrap in his manufacturing operations may keep for more than 30 days a quantity of such scrap exceeding 60,000 lb. or a minimum carload lot; whichever is greater.



**COPPER DELIVERIES:** Monthly deliveries to customers have dropped 10,896 tons since December's peak, due to cold weather, freight tie-ups and railroad embargoes. Meanwhile requirements continue to mount. Statistics prepared by the Copper Institute.

## WPB Says Zinc Will Be Allocated Soon

Washington

• • • WPB officials told the Zinc Producers' Industry Advisory Committee at a recent meeting that zinc likely will again be placed under allocation. Tin, Lead & Zinc Division officials said that the total indicated 1945 consumption is 1,078,000 tons of slab zinc as compared with an indicated production, including imports, of 870,000 tons, leaving a deficit of 208,000 tons.

Brass mill needs for the ammunition program should require an estimated 480,000 tons, while zinc for galvanizing should require 270,000 tons. Die casters, rolling mills and ingot producers of copper and copper-base alloys account for the greater part of the balance.

Domestic production of zinc concentrates, in terms of recoverable zinc, were reported to be dropping. Production is estimated at 660,000 tons as compared with 715,000 tons in 1944, while requirements were reported at 890,000 tons for the year. Imports of 340,000 tons during 1945 will improve the situation, WPB officials said, but reported that arrangements had been made for only about 50 per cent of this total.

## Copper Wire Use by Any Civilians Suspended by WPB

Washington

• • • Suspension of CMP Regulation No. 9 until June 30, and amendment of CMP-9A have been announced by WPB. CMP-9 permitted retail stores to purchase copper wire for sale to civilians and CMP-9A provides copper wire for use by civilian repair shops. Industrial procurement under CMP-9A has not been affected by the amendment. WPB said that if the copper wire situation improves sufficiently to meet military demands with enough left over to provide for civilian sales as well, the regulation can be put back into operations. Under the suspension provisions of CMP-9A retailers must immediately cancel the outstanding orders for copper wire placed under allotment symbol V-3.



**Primary Metals**

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	\$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	\$1.50 to \$1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.5%, dollars per troy oz.	\$4.50
Iridium, dollars per troy oz.	\$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	\$170.00 to \$172.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per oz.	\$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

**Remelted Metals**

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing	
No. 2, 3, 4	\$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

**Copper, Copper Base Alloys**

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.37	20.37	
Copper, H.R.	17.37		
Copper drawn	18.37		
Low brass, 80%	20.40	20.15	
High brass		19.48	
Red brass, 85%		20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut		15.01	
Commercial bronze, 90%		21.32	21.07
Commercial bronze, 95%		21.53	21.28
Manganese bronze	24.00		28.00
Phos. bronze, A, B, 5%		36.50	36.25
Muntz metal	20.12	18.37	22.75
Everdur, Herculoy, Olympic or equal		25.50	26.00
Nickel silver, 5%		28.75	26.50
Architect bronze	19.12		

**Aluminum**

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).	
Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.	
Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.	

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in.,

23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

**NON-FERROUS SCRAP METAL QUOTATIONS**

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

**Copper, Copper Base Alloys**

**OPA Group 1†**

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

**OPA Group 2†**

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

**OPA Group 3†**

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.35 <sup>1</sup>
Manganese bronze solids	6.25 <sup>2</sup>
Manganese bronze borings	6.50 <sup>1</sup>
Manganese bronze borings	5.50 <sup>2</sup>

**OPA Group 4†**

Refinery brass	4.75*
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\*Price varies with analysis. <sup>1</sup>Lead content 0.00 to 0.40 per cent. <sup>2</sup>Lead content 0.41 to 1.00 per cent.

**Magnesium**

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

**Other Copper Alloys**

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

**Aluminum**

<b>Plant scrap, segregated</b>	
2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
25S	5.00
turnings, dry basis	3.25
Low copper alloys 51, 52, 61, 63S	
solids	7.00
turnings, dry basis	5.50

<b>Plant scrap, mixed</b>	
Solids	4.00
Turnings, dry basis	3.00

<b>Obsolete scrap</b>	
Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

**Magnesium\***

<b>Segregated plant scrap</b>	
Pure solids and all other solids, exempt	
Borings and turnings	1.50

<b>Mixed, contaminated plant scrap</b>	
Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

\*Nominal.

**Zinc**

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unswaged zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

**Lead**

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

**Nickel**

Ni content 98+%, Cu under ¼%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

**ELECTROPLATING ANODES AND CHEMICALS**

**Anodes**

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25½
Electrolytic, full size	22½
cut to size	30½
Rolled, oval, straight, 15 in. and longer	23½
Curved	24½
Brass Cast, 82-20, elliptical, 15 in. and longer	23½
Zinc: Cast, 99.99, 16 in. and over	16½
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

**Chemicals**

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc, cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

## Bidders Requested to Show Interest

### New York

••• Ferrous scrap, steel, textiles, chemicals and containers are offered by way of example of types of Army surplus goods in which prospective bidders might register their interests with the New York Chemical Warfare Procurement District in a letter sent out by that office on February 12.

The district wants to place itself in a position to notify prospective bidders of lots in which they would be interested. However, the surplus items that may become available for sale by this branch of the service vary greatly in character, and it is said to be impracticable to inform every bidder of all items offered.

Communications should be addressed to the Army Service Forces, New York Chemical Warfare Procurement District, 292 Madison Ave., New York 17, N. Y.

**PITTSBURGH**—A break in the weather here has appreciably eased up the movement of scrap and has brought a little more scrap out. Yard operations have been better but the railroad car situation is very bad. Storms in both the East and West are looked upon rather apprehensively, since they may tighten up scrap movement here in spite of the good weather the district is now experiencing. Turnings prices dropped another 25c. a ton, the result of the heavy supply that is coming into the market from the shell plants.

**CHICAGO**—Purchase early this week by a major district consumer of a substantial tonnage of machine shop turnings at \$9.50 provides the first definite indication for several weeks as to the extent of market weakness in this grade, although broker-dealer transactions had pointed to this range. Tonnage purchased at this price was specified as to source and freedom from alloy inclusions, and less particular buyers might be able to secure material at a lower price, it is believed. Sales from this district to outside buyers indicated an equivalent local delivered price on short shoveling turnings of about \$9.25 to \$9.75. Some blast furnace tonnage placed at a much higher price, on which deliveries had not yet been made, was cancelled last week, which did not help the market any. Local mills are showing disinterest in receiving further shipyard scrap from the West Coast on allocation at the present time.

**DETROIT**—The scrap pattern was unchanged here this week but comparative prices on turnings grades in other areas indicated the possibility of softening on these quotations after February contracts

are filled. There was some slight slackening of electric furnace scrap demand but not enough to influence prices. Open hearth grades and foundry grades continue in heavy demand.

**BOSTON**—Carlots are moving again, mostly turnings and heavy melting steel to eastern Pennsylvania. Some are going to the Pittsburgh area. Foundry material continues scarce and shipments confined to an occasional truckload. Turnings continue weak. Prices for eastern Pennsylvania delivery are as they were last week, but for Pittsburgh delivery have been shaded by holders anxious to unload.

**PHILADELPHIA**—Mills here have not been able to make up their scrap losses of a few weeks ago and are still registering complaints with their scrap suppliers that they are consuming more scrap than they are receiving. This situation will probably not be cleared for some time since last Saturday's heavy snowfall followed by freezing weather has added to the complexities of the scrap yards in preparing scrap and in moving material already prepared. Another complicating factor has been the problem of getting empty freight cars and in getting filled cars moved out of the yards. Cast scrap has practically disappeared and the continual shortage of pig iron in the East has made operations increasingly difficult for foundries and non-integrated mills here. However, turnings are plentiful and mills are using an increased percentage in the open hearth.

**CINCINNATI**—The market continues steady with all items at ceiling prices except borings and turnings. This latter item continues weak with the supply adequate and interest on the part of consumers is lagging. Ralls and cast scrap are scarce as are low phosphorus items in short lengths. Consumers continue to take material on contract, but new contract placement is not very brisk.

**BIRMINGHAM**—Although prices are still firm here, the situation generally is very uncertain. Large consumers are practically out of the market and smaller buyers are showing little interest in obtaining material. Dealers, hard hit by a manpower shortage, are having difficulty filling tonnages already sold.

**NEW YORK**—Scrap movement continues slow here due principally to a shortage of gondola cars, the uncertain weather and an inadequate supply of labor. Prices remain at ceilings in all grades but some ralls are said to be unwilling to pay charges for transportation costs and some others limit their payment to the former \$1 springboard. Mill inventories are reported by dealers to be

very low. However, yards are in good supply and there should be no difficulty about deliveries to mills when mild weather is here to stay. Despite their inventory position, some mills are reported to be growing increasingly critical of incoming shipments.

**CLEVELAND**—Open hearth prices are still right up to the top, with the feeling that turnings are going to fall off more than they have already. Dealers can't sell enough to take care of production and turnings from other districts are filtering in.

## Change in Price Trend Expected

### New York

••• While there are no significant price trends this week, it appears that the cycle of price fluctuation so recently experienced by the scrap trade is about to begin again. That prices of scrap have not dropped more generally can only be attributed to yards, preparation and collection facilities icebound for the past several months. But weather conditions favoring the movement of scrap are gradually improving and the voluntary limitation or disallowance of transportation costs by mills grows more widespread. Some mills, nevertheless, find themselves embarrassingly low in scrap supplies and are requesting the special cooperation of their dealers in making deliveries quickly. Moreover shipments are being accepted beyond the delivery periods covered by their contracts, an indication that mill supplies are tight.

The current rise in pig iron ceilings may be expected to encourage open hearth producers to increase the proportion of scrap in their melts. This promises to provide enhanced market possibilities for the entire scrap industry and may possibly have a lasting effect even beyond the period of OPA controls. This situation was predicted at the Scrap Iron & Steel Convention, when an OPA price executive spoke of the pressure on pig iron prices, and indicated that the scrap industry, in order to take advantage of the opportunity, would have to exercise a certain amount of care about its commercial practices. The steel industry adheres scrupulously to specifications in its production and purchases pig iron in accordance with controlled compositions. Prospective increased purchases of scrap by mills will also demand careful segregation of scrap grades.



# IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

## PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$20.00*
RR. hvy. melting.	21.00*
No. 2 hvy. melting.	20.00*
RR. scrap rails.	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bldd. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	\$13.75 to 14.25
Short shov. turn.	16.00 to 16.50
Mixed bor. and turn.	13.50 to 14.00
Cast iron borings.	16.00*
Hvy. break. cast.	16.50*
No. 1 cupola.	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs.	24.50*
Rail leaf springs.	24.50*
Rolled steel wheels.	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

## CHICAGO

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$18.75*
No. 2 hvy. melting.	18.75*
No. 1 bundles.	18.75*
No. 2 dealers' bndls.	\$16.25 to 16.75
Galv. bundles.	14.25 to 14.75
Mach. shop turn.	9.00 to 9.50
Short shovel. turn.	9.25 to 9.75
Cast iron borings.	9.25 to 9.75
Mix. borings & turn.	9.25 to 9.75
Low phos. hvy. forge	23.75*
Low phos. plates.	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails.	22.25*
Miscellaneous rails.	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & splice bars	22.25*
Std. car axles	25.75*
No. 3 steel wheels.	22.75 to 23.25
Couplers & knuckles	23.25*
Agricul. malleable.	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast	16.50*
RR. grate bars.	15.25*
Cast iron brake sh's	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

## CINCINNATI

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$19.50*
No. 2 hvy. melting.	19.50*
No. 1 bundles.	19.50*
No. 2 bundles.	19.50*
Mach. shop turn.	\$8.50 to 9.00
Shoveling turn.	16.50*
Cast iron borings.	8.50 to 9.50
Mixed bor. & turn.	8.50 to 9.50
Low phos. plate.	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Scrap rails	21.50*

## BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting.	\$15.05*
No. 2 hvy. melting.	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovels	\$11.00 to 11.06
Machine shop turn.	9.00 to 9.06
Mixed bor. & turn.	9.00 to 9.06
Cl'n cast, chem. bor.	13.06 to 14.15*
Truck delivery to foundry	
Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

## DETROIT

Per gross ton, brokers' buying prices:	
No. 1 hvy. melting.	\$17.32*
No. 2 hvy. melting.	17.32*
No. 1 bundles.	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	\$8.50 to 9.00
Short shov. turn.	11.00 to 11.50
Cast iron borings.	10.00 to 10.50
Mixed bor. & turn.	8.50 to 9.00
Low phos. plate.	18.50 to 19.32
No. 1 cupola cast.	20.00*
Charging box cast.	18.00 to 19.00
Hvy. breakable cast	16.50*
Stove plate	18.50 to 19.00
Automotive cast	20.00*

## PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$18.75*
No. 2 hvy. melting.	18.75*
No. 2 bundles.	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings.	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Cast, charging box.	19.00*
Hvy. axle, forge turn	18.25*
Low phos. plate.	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels.	23.25*
RR. coil springs.	23.25*
RR. malleable	22.00*

## ST. LOUIS

Per gross ton delivered to consumer:	
Heavy melting	\$17.50*
Bundled sheets	17.50*
Mach. shop turn.	\$8.00 to 8.50
Hvy. axle turn.	16.75
No. 1 loco. tires.	20.00
Misc. std. sec. rails.	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles.	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	18.50*
No. 1 mach'ry cast	20.00*
Breakable cast	16.50*

## BIRMINGHAM

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$17.00*
No. 2 hvy. melting.	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	\$9.50 to 10.00
Cast iron borings.	9.50 to 10.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

## YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$20.00*
No. 2 hvy. melting.	20.00*
Low phos. plate.	22.50*
No. 1 busheling	20.00*
Hydraulic bundles.	20.00*
Mach. shop turn.	\$13.00 to 13.50
Short shovel. turn.	15.00 to 15.50
Cast iron borings.	14.00 to 14.50

## NEW YORK

Dealers' buying prices, per gross ton, on cars	
No. 1 hvy. melting.	\$15.32*
No. 2 hvy. melting.	15.32*
Comp. black bundles	15.32*
Comp. galv. bundles	13.32*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Charging box cast.	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

## BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$19.25*
No. 1 bundles.	19.25*
No. 2 bundles.	19.25*
No. 2 hvy. melting.	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings.	15.25*
Mixed bor. & turn.	14.25*
No. 1 cupola cast.	20.00*
Stove plate	19.00*
Low phos. plate.	21.75*
Scrap rails	20.75*
Rails 3 ft. & under.	22.75*
RR. steel wheels.	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

## CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$19.50*
No. 2 hvy. melting.	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles.	19.50*
Mach. shop turn.	\$12.50 to 13.00
Short shovel.	14.50 to 15.00
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	23.66*
Cast iron borings.	13.50 to 14.00
Mixed bor. & turn.	12.50 to 13.00
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting.	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling.	23.00*
Railroad malleable.	22.00*
Elec. furnace punch.	22.00*

## SAN FRANCISCO

Per gross ton delivered to consumer:	
RR. hvy. melting.	\$15.50 to \$16.25
No. 1 hvy. melting.	15.50 to 16.25
No. 2 hvy. melting.	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

## LOS ANGELES

Per gross ton delivered to consumer:	
No. 1 hvy. melting.	\$14.00 to \$15.00
No. 2 hvy. melting.	13.00 to 14.00
No. 2 bales	12.00 to 13.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

## SEATTLE

Per gross ton delivered to consumer:	
RR. hvy. melting.	\$13.50
No. 1 hvy. melting.	13.50
No. 3 bundles.	11.50
Elec. furn. 1 ft. und.	\$16.00 to 17.00
No. 1 cupola cast.	20.00*



# Comparison of Prices . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 158-167.

Flat Rolled Steel:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Cents Per Lb.)	1945	1945	1945	1944
Hot rolled sheets*	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)*	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates*	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Dollars Per Base Box)				
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails*	2.55	2.55	2.55	2.55

Rails:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Dollars Per Gross Ton)				
Heavy rails*	\$40.00	\$40.00	\$40.00	\$40.00
Light rails*	40.00	40.00	40.00	40.00

Semi-Finished Steel:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Dollars Per Gross Ton)				
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

\* For interim increase on delivered price granted by OPA as of Jan. 11, 1945, see detailed price tables.

Pig Iron:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Per Gross Ton)				
No. 2 fdy., Philadelphia	\$25.84	\$25.84	\$25.84	\$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti.	25.11	25.11	25.11	23.94
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.  
‡ For carlots at seaboard.

Scrap:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.25	22.50
No. 1 cast, Pittsburgh	20.00*	20.00*	20.00*	20.00
No. 1 cast, Philadelphia	20.00*	20.00*	20.00*	20.00
No. 1 cast, Chicago	20.00*	20.00*	20.00*	20.00

\* F.O.B. shipping point.

Coke, Connellsville:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Per Net Ton at Oven)				
Furnace coke, prompt	\$7.00	\$7.00	\$7.00	\$7.00
Foundry coke, prompt	8.25	8.25	8.25	8.25

Non-Ferrous Metals:	Feb. 20, 1945	Feb. 13, 1945	Jan. 16, 1945	Feb. 22, 1944
(Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

# Composite Prices . . .

[ Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue. ]

FINISHED STEEL	
February 20, 1945	2.25839c. a Lb.
One week ago	2.25839c. a Lb.
One month ago	2.25839c. a Lb.
One year ago	2.27235c. a Lb.

HIGH		LOW	
1945	2.25839c., Jan. 16	2.21189c., Jan. 2	
1944	2.30837c., Sept. 5	2.21189c., Oct. 5	
1943	2.25513c.	2.25513c.	
1942	2.26190c.	2.26190c.	
1941	2.43078c.	2.43078c.	
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	
1939	2.35367c., Jan. 3	2.26689c., May 16	
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	
1933	1.95578c., Oct. 3	1.75836c., May 2	
1932	1.89196c., July 5	1.83901c., Mar. 1	
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	
1929	2.31773c., May 28	2.26498c., Oct. 29	

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 23, 1941, issue.

PIG IRON	
February 20, 1945	\$24.61 a Gross Ton
One week ago	\$23.61 a Gross Ton
One month ago	\$23.61 a Gross Ton
One year ago	\$23.61 a Gross Ton

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

SCRAP STEEL	
February 20, 1945	\$19.17 a Gross Ton
One week ago	\$19.17 a Gross Ton
One month ago	\$19.17 a Gross Ton
One year ago	\$19.17 a Gross Ton

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# Trial

...BY JURY

It's the courtroom drama... exhibit "A"... the woman in black or red or green... that gets the banner headlines.

But it's the dreary, backstage drudgery... the endless sifting of every shred of evidence... that wins the case.

It's pretty much the same story with modern *power links*, too. Endless investigation and research into design, manufacture, application and service must precede production.

For more than 26 years now, Twin Disc engineers have been digging out the facts... probing every possibility that stands the remotest chance of contributing to better clutches and hydraulic drives... to more efficient transmission and control of power.

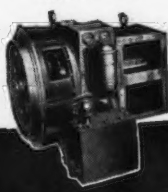
Thanks to this painstaking preparation, Twin Disc Clutches and Hydraulic Drives have "won the verdict" of a jury that numbers its members in the thousands... a jury that includes both manufacturers and users of virtually all types of powered industrial equipment.

If your product involves a problem of power transmission and control, why not take it to Twin Disc engineers? They may have the clue that will solve the case. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Heavy Duty Clutch



Hydraulic Torque Converter



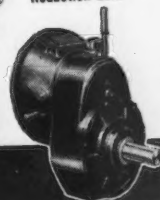
Machine Tool Clutch



**TWIN DISC**  
CLUTCHES AND HYDRAULIC DRIVES

REG. U.S. PAT. OFF.

Reduction Gear



Marine Gear



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

# Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in.. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) Portland and Seattle price, San Francisco 2.50c. (13) This base price for annealed, bright finish wires, commercial spring wire. (14) Add 10c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (15) Add 15c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (16) Add 10c. per 100 lb. to delivered price of plates produced to sheared mill or universal mill width and length tolerances—OPA interim increase, Jan. 11, 1945.

Basing Point Product												DELIVERED TO				
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	Detroit	New York	Phila- delphia	
<b>SHEETS</b>																
Hot rolled <sup>15</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢	
Cold rolled <sup>1</sup>	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢	
Galvanized (24 gage) <sup>16</sup>	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢	
Enameling (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢	
Long ternes <sup>2</sup>	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢	
<b>STRIP</b>																
Hot rolled <sup>3</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢		
Cold rolled <sup>4</sup>	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester=3.00¢)				2.90¢	3.16¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢		
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢		(Worcester=3.35¢)				3.05¢	3.31¢		
<b>TIN PLATE</b>																
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.36¢	5.32¢	
Electro, box (0.25 lb. 0.50 lb. 0.75 lb.)	\$4.35 \$4.50 \$4.65	\$4.35 \$4.50 \$4.65	\$4.35 \$4.50 \$4.65						\$4.60 \$4.75							
<b>BLACK PLATE</b>																
29 gage <sup>5</sup>	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ <sup>12</sup>			3.37¢	
<b>TERNES, MFG.</b>																
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40							
<b>BAR</b>																
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth=2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢	
Rail steel <sup>6</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢				
Reinforcing (billet) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢ <sup>13</sup>	2.25¢	2.39¢		
Reinforcing (rail) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢ <sup>13</sup>	2.25¢		2.47¢	
Cold finished <sup>8</sup>	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)	(Toledo=2.80¢)				2.99¢	2.97¢	
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			(Bethlehem, Massillon, Canton=2.70¢)				2.80¢			
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢			
<b>PLATES</b>																
Carbon steel <sup>17</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢	(Coatesville and Claymont=2.10¢)		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢										3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢				(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
<b>SHAPES</b>																
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem=2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢	
<b>SPRING STEEL, C-R</b>																
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester=3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester=4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester=6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester=8.55¢)							
<b>WIRE</b>																
Bright <sup>14</sup>	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester=2.70¢)	(Duluth=2.65¢)	3.10¢					2.92¢
Galvanized																
Spring (High Carbon)	3.20¢	3.20¢		3.20¢					(Worcester=3.30¢)			3.70¢				3.52¢
<b>PILING</b>																
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢				2.72¢

## EXCEPTIONS TO PRICE SCHED. NO. 6.

Slabs—Andrews Steel Co. \$41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Co. \$41; Phoenix Iron Co. (rerolling) \$41, (forging) \$47; Granite City Steel \$47.50; Kaiser Co. rerolling \$58.64, (forging) \$64.64, f.o.b. Los Angeles.

Blooms—Phoenix Iron Co. (rerolling) \$41; (forging) \$47; Pgh. Steel Co. (rerolling) \$38.25, (forging) \$44.25; Wheeling Steel Corp.

(rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) \$58.64, (forging) \$64.64, (shell steel) \$74.64 f.o.b. Los Angeles.

Sheet bar—Empire Sheet & Tin Plate Co. \$39 mill; Wheeling Steel Corp. \$38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. \$50 basing pts.; Follansbee Steel Corp. \$49.50 Toronto, Ohio; Phoenix Iron Co. \$47 mill; Geneva Steel Co. \$64.64 f.o.b. Pacific Coast; Pitts-

burgh Steel Co. \$49.50; Kaiser Co. \$64.64, (shell steel) \$74.64, f.o.b. Los Angeles.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switchings area \$34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) \$41 mill; Wheeling Steel Corp. 4 in. sq. or larger \$37.75, smaller \$39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at \$39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. \$41 mill; Contin-



## PRICES

tal Steel Corp. (1½ x 1½) \$39.50, (2 x 2) \$40.60 Kokomo, Ind. (these prices include \$1 size extra); Keystone Steel & Wire Co. \$36.40 Peoria; Connors Steel Co. \$50.60 Birmingham; Ford Motor Co. \$34 Dearborn, Mich.; Geneva Steel Co. \$58.64 f.o.b. Pacific Coast; Pgh. Steel Co. \$43.50; Kaiser Co. \$58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. \$2.35 basing pts. (export) \$2.50 Phoenixville; Knoxville Iron Co. \$2.30 basing points; Kaiser Co. \$3.20 f.o.b. Los Angeles.

Rails—Sweet Steel Co. (rail steel) \$50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., \$45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. \$2.65 mill; Knoxville Iron Co. \$2.25 basing pts.; Kaiser Co. and Geneva Steel Co. \$3.20 Pacific Ports; Central Iron and Steel Co. \$2.50 basing points; Granite City Steel Co. \$2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, \$2.85 mill; Eckels-Nye Steel Corp. \$2.50 basing pts. (rail steel) \$2.40; Phoenix Iron Co. \$2.40 basing pts.; Sweet Steel Co. (rail steel) \$2.33 mill; Joslyn Mfg. & Supply Co., \$2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), \$2.35 Chicago; Knoxville Iron Co., \$2.30 basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.; Milton Mfg. Co., \$2.75 f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, \$2.05 per 100 lb.

Reinforcing Bars—W. Ames & Co., 10 tons and over, \$2.85 mill; Sweet Steel Co. (rail steel), \$2.33 mill; Columbia Steel Co., \$2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., \$2.30 Chicago; Knoxville Iron Co., \$2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., \$2.25 Parkersburg.

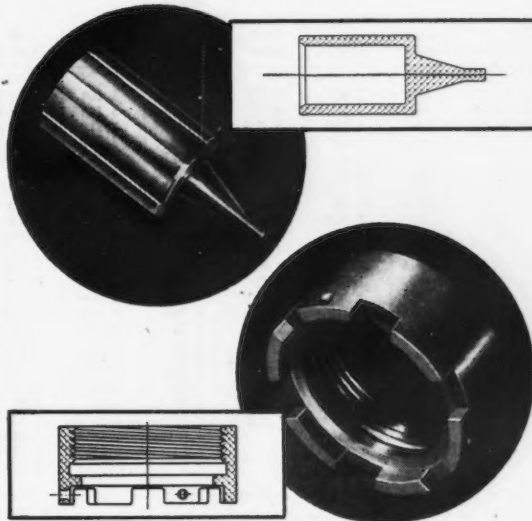
Galvanized Sheets—Andrews Steel Co., \$3.75 basing pts.; Parkersburg Iron & Steel Co., \$3.85 Parkersburg; Apollo Steel Co., \$3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

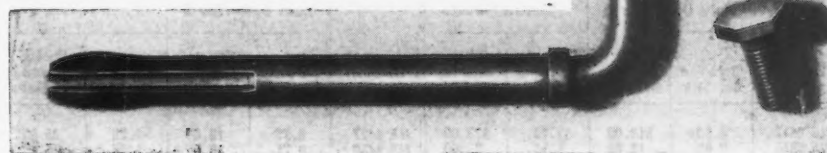
Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is \$2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., \$2.20; rods, heavier than 9/32, \$2.35; bright wire, \$2.725; bright nails, \$2.90; lead and furnace annealed wire, \$2.85; pot annealed wire, \$2.85; galvanized barbed wire, \$3.90; plain staples, \$2.55; galvanized staples, \$2.65; bright spring wire, \$3.30; galvanized spring wire, \$3.45.

## for SCREW MACHINE PRODUCTS...



## ...or COLD FORGED PARTS—



## FOCUS ON *Federal Screw!*

For screw machine products and cold-forged parts, Federal Screw Works may well be your most logical source of supply. Our extensive plants are fully equipped for all screw machine and second-operation work, and for widely varied cold-forging and thread-rolling jobs as well. And we have the specialized skill and experience to meet your most exacting needs . . . in any volume . . . and right on schedule.

Our manufacturing specialists will be glad to work with you on both your present and post-war production problems. Without obligation on your part, let's sit down and talk it over—now!

### One of the First

### SIX TIME WINNERS OF THE ARMY-NAVY "E"

In January of this year, 48 concerns throughout the country were the first to receive a fifth star for their Army-Navy "E" flags. Federal Screw was among those to be honored. Since the award of

the Navy "E" burgee early in 1942, this company has maintained its record of high production achievement since the earliest days of the war.



# Federal

## SCREW WORKS

DETROIT AND CHELSEA, MICHIGAN  
MAIN OFFICES: 3401 Martin Ave., Detroit 10, Michigan

# PRICES

## WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
**Philadelphia	3.518	4.872 <sup>a</sup>	5.018 <sup>a</sup>	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613 <sup>a</sup>	5.010	3.974 <sup>a</sup>	4.772	3.768	3.768	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744 <sup>a</sup>	5.224 <sup>a</sup>	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052				
Norfolk	3.771	4.965	5.371	4.185	4.865	3.971	4.002	4.065	4.185				
Chicago	3.25	4.20	5.231	3.60	4.651 <sup>7</sup>	3.55	3.55	3.75	5.75	6.85	6.85	6.85	7.90
Milwaukee	3.387	4.337 <sup>a</sup>	5.272 <sup>a</sup>	3.737	4.787 <sup>17</sup>	3.687	3.687	3.837	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877 <sup>a</sup>	3.60	4.45	3.40	3.588	3.35	3.75	5.966	7.066	6.85	7.90
Buffalo	3.35	4.40	4.75 <sup>a</sup>	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00 <sup>a</sup>	3.70	4.689 <sup>17</sup>	3.609	3.661	3.45	3.80	6.00	7.10	7.159	8.209
Cincinnati	3.425	4.475 <sup>a</sup>	4.825 <sup>a</sup>	3.675	4.711	3.611	3.691	3.611	4.011				
St. Louis	3.397	4.347 <sup>a</sup>	5.172 <sup>a</sup>	3.747	4.831 <sup>17</sup>	3.697	3.697	3.847	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257 <sup>a</sup>	3.88	4.351 <sup>7</sup>	3.811 <sup>3</sup>	3.811 <sup>3</sup>	3.781 <sup>3</sup>	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608 <sup>a</sup>	4.215	4.185	4.165	4.115	4.43	3.98	6.08	7.18	7.18	8.23
Indianapolis	3.55	3.58	4.688	4.918	3.768	4.78	3.63	3.55	3.98				
Birmingham	3.45	4.45	4.75	3.70		3.55	3.55	3.50	4.43				
Memphis	3.365 <sup>7</sup>	4.86	5.265	4.215		4.985	4.065	4.015	4.33				
New Orleans	4.058 <sup>a</sup>	4.95	5.358	4.308		4.158	4.158 <sup>a</sup>	4.108 <sup>a</sup>	4.629				
Houston	3.763	5.573	6.313 <sup>1</sup>	4.313		4.25	4.25	3.75	6.373 <sup>a</sup>	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20 <sup>3</sup>	8.10 <sup>4</sup>	4.95	5.613 <sup>15</sup>	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.551 <sup>4</sup>	7.30 <sup>4</sup>	8.35 <sup>4</sup>	4.60 <sup>4</sup>	7.333 <sup>17</sup>	4.651 <sup>4</sup>	4.351 <sup>4</sup>	4.151 <sup>4</sup>	5.333	8.304	9.404	9.404	10.454
Seattle	4.651 <sup>2</sup>	7.05 <sup>a</sup>	5.95 <sup>a</sup>	4.251 <sup>2</sup>		4.751 <sup>2</sup>	4.451 <sup>2</sup>	4.351 <sup>2</sup>	5.783				
Portland	4.651 <sup>17</sup>	6.60 <sup>a</sup>	5.75 <sup>a</sup>	4.751 <sup>1</sup>		4.751 <sup>1</sup>	4.451 <sup>1</sup>	4.451 <sup>1</sup>	5.833	8.304	9.404	8.304	9.404
Salt Lake City	4.531 <sup>7</sup>		6.171 <sup>8</sup>	5.631 <sup>7</sup>		4.981 <sup>7</sup>	4.981 <sup>7</sup>	4.881 <sup>7</sup>	5.90				

## National Emergency Steels MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 9612	0.65¢	\$13.00	\$1.15	\$23.00	NE 9427	0.75	15.00	1.25	25.00
NE 9615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 9617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 9620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 9622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 9625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 9627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 9630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 9632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 9635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 9637	0.65	13.00	1.15	23.00					
NE 9640	0.65	13.00	1.15	23.00	NE 9722	0.65¢	\$13.00	\$1.15	\$23.00
NE 9642	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 9645	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 9647	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
NE 9650	0.65	13.00	1.15	23.00	NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 9712	0.70¢	\$14.00	\$1.20	\$24.00	NE 9747	0.65	13.00	1.15	23.00
NE 9715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 9717	0.70	14.00	1.20	24.00	NE 9753	0.65	13.00	1.15	23.00
NE 9720	0.70	14.00	1.20	24.00	NE 9758	0.65	13.00	1.15	23.00
NE 9722	0.70	14.00	1.20	24.00					
NE 9725	0.70	14.00	1.20	24.00	NE 9830	\$1.30	\$26.00	\$1.80	\$36.00
NE 9727	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 9730	0.70	14.00	1.20	24.00	NE 9835	1.30	26.00	1.80	36.00
NE 9732	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 9735	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 9737	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 9740	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 9742	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 9745	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 9747	0.70	14.00	1.20	24.00					
NE 9750	0.70	14.00	1.20	24.00	NE 9912	\$1.20	\$24.00	\$1.55	\$31.00
NE 9415	0.75¢	\$15.00	\$1.25	\$25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and \$5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of \$2.70 for 100 lb. on finished products and \$64 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

## BASE QUANTITIES

Standard unless otherwise keyed on prices.

**HOT ROLLED:** Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

**COLD ROLLED:** Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

**EXCEPTIONS:** (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 8749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 800 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

\*Add 0.271c. for sizes not rolled in Birmingham. \*\*City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

## LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports\*)

Per Gross Ton

Old range, bessemer, 51.50 ..... \$4.75  
Old range, non-bessemer, 51.50 ..... 4.60  
Mesaba, bessemer, 51.50 ..... 4.60  
Mesaba, non-bessemer, 51.50 ..... 4.45  
High phosphorus, 51.50 ..... 4.35

\*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

## FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

### Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Base price per short ton  
Effective CaF<sub>2</sub> Content:  
70% or more ..... \$33.00  
65% but less than 70% ..... 32.00  
60% but less than 65% ..... 31.00  
Less than 60% ..... 30.00



## NEWS OF INDUSTRY

### SEMI-FINISHED STEEL

#### Ingots, Carbon, Rolling

Base per gross ton, f.o.b. mill. . . . \$31.00  
 Exceptions: Phoenix Iron Co. may charge, \$38.75; Kaiser Co., \$43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinsplate Co., \$34.25; Pgh. Steel Co., \$33.10.

#### Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown . . . . . \$36.00

Exceptions: Phoenix Iron Co. may charge \$39.25, f.o.b. Mansfield, Ohio; West Coast producers, \$48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., \$38.10.

#### Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh . . . . . \$45.00

Exceptions: C/L delivered Detroit add \$2.00; delivered East Michigan add \$3.00. Connors Steel Co. may charge \$45.00 f.o.b. Birmingham.

#### Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.00 higher; delivered E. Michigan, \$3 higher; f.o.b. Duluth, billets only, \$2.00 higher; billets f.o.b. Pacific ports are \$12 higher. Provo, \$11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

#### Per Gross Ton

Rerolling . . . . . \$34.00  
 Forging quality . . . . . 40.00  
 For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

#### Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton . . . . . \$54.00  
 Price delivered Detroit \$2.00 higher; E. Michigan, \$3.00 higher.

#### Shell Steel

#### Per Gross Ton

3 in. to 12 in. . . . . \$52.00  
 12 in. to 18 in. . . . . 54.00  
 18 in. and over . . . . . 56.00  
 Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.  
 Prices delivered Detroit are \$2.00 higher; E. Michigan, \$3 higher.  
 Price Exception: Follansbee Steel Corp. permitted to sell at \$13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of \$52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

#### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

#### Per Gross Ton

Open hearth or bessemer . . . . . \$34.00

#### Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

#### Per Lb.

Grooved, universal and sheared . . 1.90c.

#### Wire Rods

(No. 5 to 9/32 in.)

#### Per Lb.

Pittsburgh, Chicago, Cleveland . . . 2.00c.  
 Worcester, Mass. . . . . 2.10c.  
 Birmingham . . . . . 2.00c.  
 San Francisco . . . . . 2.50c.  
 Belyeston . . . . . 2.25c.  
 9/32 in. to 47/64 in., 0.15c. a lb. higher.  
 Quantity extras apply.

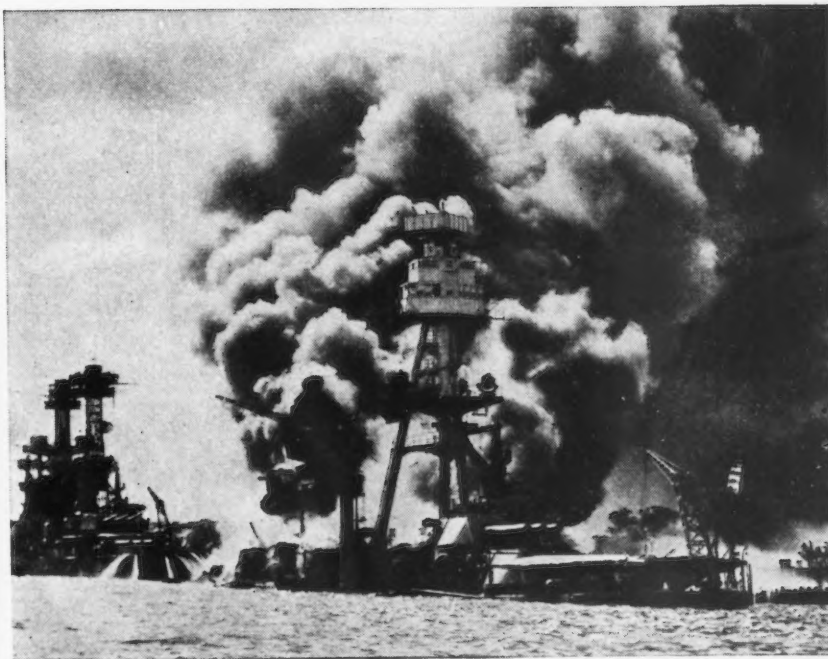
### TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

#### Base per lb.

High speed . . . . . 67c.  
 Straight molybdenum . . . . . 54c.  
 Tungsten-molybdenum . . . . . 57 3/4c.  
 High-carbon-chromium . . . . . 43c.  
 Oil hardening . . . . . 24c.  
 Special carbon . . . . . 22c.  
 Extra carbon . . . . . 18c.  
 Regular carbon . . . . . 14c.  
 Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 1c. higher.

# TECTYL GIVES YOU TESTED, PROVEN PROTECTION AGAINST RUST



(Official U. S. Navy Photograph)

## PROVEN UNDER FIRE!

The government bought 30,000 gallons of Tectyl on December 8, 1941, to be shipped to Pearl Harbor—because U. S. salvage experts had seen what Tectyl had done on the submarine Squalus and in many other instances. In industry, too, Tectyl has proven itself under the most difficult conditions—prove it in your own plant.

## 5 SPECIALIZED TYPES

—one will solve your special rust-prevention problem, however big or tough it may be. Indoors or out, for long term storage or short periods during production, **WHAT-EVER** your need is—Tectyl is science's new answer to rust. Easy to apply and remove, economical to use, Tectyl protection is *positive*. Write today, indicating your corrosion problem, and we will send you our Tectyl bulletin with complete application data.

# TECTYL STOPS RUST

## VALVOLINE OIL COMPANY

*Finest Lubricating Oils Since 1866*

468 Culvert Street

Cincinnati 2, Ohio

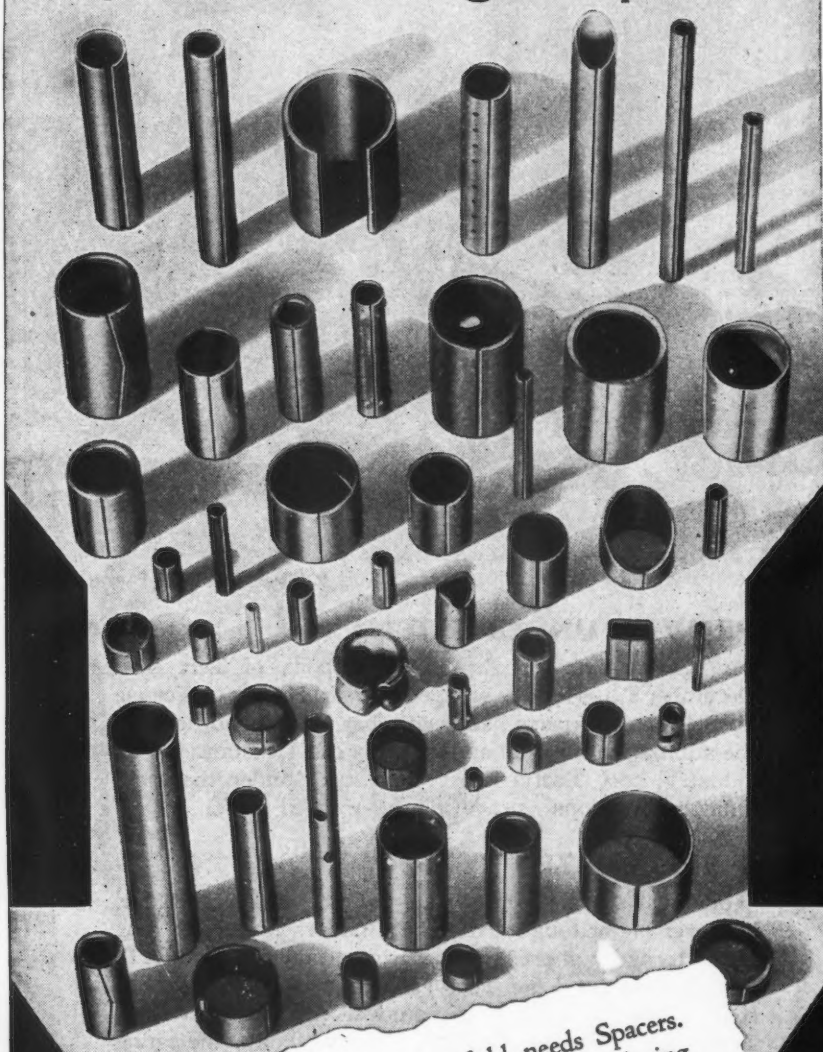
Refinery at Butler, Pennsylvania

General Offices, Cincinnati, Ohio

New York - Atlanta - Detroit - Chicago - Los Angeles - Vancouver - Washington, D. C.



# Your Products Can Probably be Improved with Wagner Spacers



Nearly every product in every field needs Spacers. We have perfected a new method of producing them, on specially designed automatic machines, in any metal and in a large variety of sizes and shapes. Every day manufacturers find new uses for Wagner Rolled Butted-Joint Spacers and Bushings. They speed up production and are economical to use. Investigate the use of Wagner Spacers in your products. Write today.

**E. R. WAGNER MFG. COMPANY**  
 4613 North 32nd Street • Milwaukee 9, Wisconsin  
 Since 1899 producers of Metal Specialties, Continuous Hinges, Hinges and Hardware.

## NEWS OF INDUSTRY

### WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills  
 (F.o.b. Pittsburgh only on wrought pipe)  
 Base Price—\$200.00 per Net Ton

#### Steel (Butt Weld)

	Black	Galv.
1/2 in. ....	63 1/2	51
3/4 in. ....	66 1/2	55
1 to 3 in. ....	68 1/2	57 1/2

#### Wrought Iron (Butt Weld)

1/2 in. ....	24	3 1/2
3/4 in. ....	30	10
1 and 1 1/4 in. ....	34	16
1 1/2 in. ....	38	18 1/2
2 in. ....	37 1/2	18

#### Steel (Lap Weld)

2 in. ....	61	49 1/2
2 1/2 in. and 3 in. ....	64	52 1/2
3 1/2 to 6 in. ....	66	54 1/2

#### Wrought Iron (Lap Weld)

2 in. ....	30 1/2	12
2 1/2 to 3 1/2 in. ....	31 1/2	14 1/2
4 in. ....	33 1/2	18
4 1/2 to 8 in. ....	32 1/2	17

#### Steel (Butt, extra strong, plain ends)

1/2 in. ....	61 1/2	50 1/2
3/4 in. ....	65 1/2	54 1/2
1 to 3 in. ....	67	57

#### Wrought Iron (Same as Above)

1/2 in. ....	25	6
3/4 in. ....	31	12
1 to 2 in. ....	38	19 1/2

#### Steel (Lap, extra strong, plain ends)

2 in. ....	59	48 1/2
2 1/2 and 3 in. ....	63	52 1/2
3 1/2 to 6 in. ....	66 1/2	56

#### Wrought Iron (Same as Above)

2 in. ....	33 1/2	15 1/2
2 1/2 to 4 in. ....	39	22 1/2
4 1/2 to 6 in. ....	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

### CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago....	\$54.80
6-in. and larger, del'd New York....	52.20
6 in. and larger, Birmingham....	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles....	69.40
6-in. and larger f.o.b. cars, Seattle....	71.20
Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.	

### BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless	Lap Weld
	Cold Hot	Hot
2 in. o.d. 13 B.W.G. ....	15.03	13.94
2 1/2 in. o.d. 12 B.W.G. ....	20.21	17.54
3 in. o.d. 12 B.W.G. ....	22.48	19.50
3 1/2 in. o.d. 11 B.W.G. ....	23.37	24.62
4 in. o.d. 10 B.W.G. ....	35.20	30.54
(Extras for less carload quantities)		
40,000 lb. or ft. and over .....	Base	Base
30,000 lb. or ft. to 39,999 lb. or ft. ....	5%	5%
20,000 lb. or ft. to 29,999 lb. or ft. ....	10%	10%
10,000 lb. or ft. to 19,999 lb. or ft. ....	20%	20%
5,000 lb. or ft. to 9,999 lb. or ft. ....	30%	30%
2,000 lb. or ft. to 4,999 lb. or ft. ....	45%	45%
Under 2,000 lb. or ft. ....	65%	65%

# PRICES

## WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
Standard wire nails....	\$2.55†	\$3.05†
Coated nails.....	2.55†	3.05†
Cut nails, carloads....	3.35	.....
Base per 100 lb.		
Annealed fence wire...	\$3.05	\$3.55
Annealed galv. fence wire	3.40	2.90
Base Column		
Woven wire fence*...	.67	.25
Fence posts, carloads...	.69	.86
Single loop bale ties...	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbed wire..	.70	.....

\*15 1/4 gage and heavier. \*\*On 80-rod spools in carload quantities.  
†Prices subject to switching or transportation charges.  
‡Add 25c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945.

## BOLTS, NUTS, RIVETS, SET SCREWS

**Bolts and Nuts**  
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

<b>Machine and Carriage Bolts:</b>	
Base discount less case lots	
Per Cent Off List	
1/2 in. & smaller x 6 in. & shorter...	65 1/2
3/16 & 1/2 in. x 6 in. & shorter....	63 1/2
1/2 to 1 in. x 6 in. shorter.....	61
1 1/2 in. and larger, all lengths....	59
All diameters over 6 in. long.....	59
Lag, all sizes.....	62
Plow bolts.....	65

## Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)	
1/2 in. and smaller.....	62
3/16 to 1 in. inclusive.....	59
1 1/2 to 1 1/2 in. inclusive.....	57
1 1/2 in. and larger.....	56
On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.	

## Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

Base discount less keg lots	
7/16 in. and smaller.....	64
1/2 in. and smaller.....	63
3/4 in. through 1 in.....	60
3/16 in. through 1 in.....	59
1 1/2 in. through 1 1/2 in.....	57
1 1/2 in. and larger.....	56
In full keg lots, 10 per cent additional discount.	

## Stove Bolts Consumer

Packages, nuts loose.....	71 and 10
In packages, with nuts attached....	71
In bulk.....	80
On stove bolts freight allowed up to 35c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.	

## Large Rivets (1/2 in. and larger)

Base per 100 Lb.	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....	\$3.75

## Small Rivets (7/16 in. and smaller)

Per Cent Off List	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....	65 and 5

## Cap and Set Screws Consumer

Per Cent Off List	
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.....	64
Upset set screws, cup and oval points	71
Milled studs.....	46
Flat head cap screws, listed sizes....	36
Fillister head cap, listed sizes.....	51
Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.	

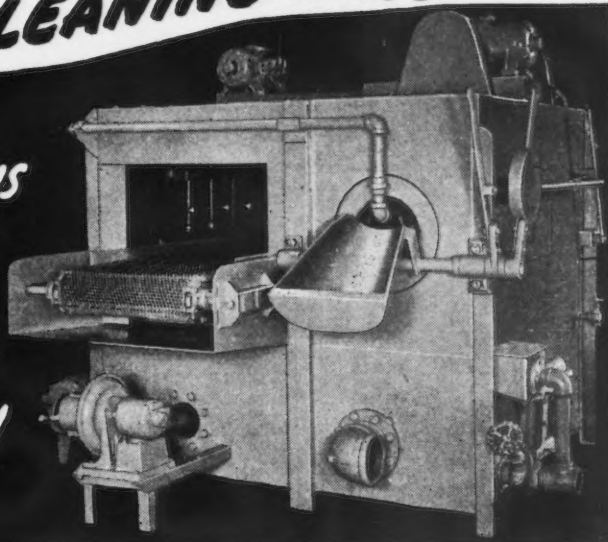
## ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
1-lb. coating I.C....	\$6.00	\$12.00
1 1/2-lb. coating I.C....	7.00	14.00
2-lb. coating I.C....	7.50	15.00

# "SIAMESE TWIN" CLEANING RACE

*Always Ends in a Perfect Finish!*



THIS ALVEY-FERGUSON Duo-Cleaning Equipment was built in the form of a "Siamese Twin"—with the Rotary Drum Machine and Wire Mesh Conveyor Machine built side by side in the same housing and using the same set of pumps and the same supply tank.

The small parts are conveyed to the machine in metal boxes covered with cutting oil. The small parts are cleaned in the rotary drum machine, the metal box in the wire mesh conveyor machine. The parts and box are thoro-cleaned as they "race" through the equipment which is synchronized so that the box always comes out first, in plenty of time to carry the same parts on to their destination.

The loading hopper on the rotary drum side can be operated from either end of the machine.

Have you a metal products cleaning and finishing problem? Let us help you solve it. Write today.

## THE ALVEY-FERGUSON COMPANY

Offices in Principal Cities  
709 Disney Street Cincinnati 9, Ohio  
Affiliated Corporation  
The Alvey-Ferguson Company of California, P. O. Box 396, Los Angeles 11, Cal.

## CONVEYING EQUIPMENT



# Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT



# PRICES

## PIG IRON

All prices set in bold face type are maximums established by OPA as of February 14, 1945. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	\$26.50	\$26.00	\$27.50	\$27.00		
Brooklyn	28.50	28.00		29.00		
Jersey City	27.53	27.03	28.53	28.03		
Philadelphia	26.84	26.34	27.84	27.34	\$31.74	
Bethlehem	\$25.00	\$25.50	\$27.00	\$26.50		
Everett, Mass.	25.00	25.50	27.00	26.50		
Swedeland, Pa.		25.50		26.50		
Steelton, Pa.		25.50			\$30.50	
Birchboro, Pa.	26.03	25.50	27.00	26.50	30.50	
Sparrows Point, Md.	26.00	25.50				
Erie, Pa.	25.00	24.50	26.00	25.50		
Neville Island, Pa.	25.00	24.50	25.50	25.00		
Sharpesville, Pa. (1)	25.00	24.50	25.50	25.00		
Buffalo	25.00	24.00	26.00	25.50	30.50	
Cincinnati, Ohio	26.11	25.61		26.11		
Canton, Ohio	26.39	25.89	26.89	26.39	33.69	
Mansfield, Ohio	26.94	26.44	27.44	26.94	33.96	
St. Louis	25.50	25.50				
Chicago	25.00	24.50	25.50	25.00	36.46	\$37.34
Granite City, Ill.	25.00	24.50	25.50	25.00		
Cleveland	25.00	24.50	25.50	25.00	33.42	
Hamilton, Ohio	25.00	24.50				
Toledo	25.00	24.50	25.50	25.00		
Youngstown	25.00	24.50	25.50	25.00	33.42	
Detroit	25.00	24.50	25.50	25.00		
Lake Superior, Ic.					34.00	
Lyles, Tenn., Ic. (2)					33.00	
St. Paul	27.63	27.13	28.10	27.63	40.80	
Duluth	25.50	25.00	26.00	25.50		
Birmingham	21.38	20.00	26.00			
Los Angeles	27.95					
San Francisco	27.95					
Seattle	27.95					
Provo, Utah	23.00	22.50				
Montreal	28.50	28.50		29.00		
Toronto	26.50	26.50		27.00		

GRAY FORGE IRON: Valley or Pittsburgh furnace..... \$24.50

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for \$28.50 at the furnace.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.35 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

## METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21 1/2 to 23 1/2 c.
Copper, reduced, 150 and 200 mesh	20 1/2 to 25 1/2 c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	13 1/2 to 15 c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	40 c.
Iron, hydrogen reduced, 300 mesh and finer, 98 1/2 + % Fe, drum lots	63 c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to 330	
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42 c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90 c.
Aluminum, 100 and 200 mesh	23 to 37 c.
Antimony, 100 mesh	20.60 c.
Cadmium, 100 mesh	\$1
Chromium, 150 mesh	1.03 c.
Lead, 100, 200 & 300 mesh	11 1/2 to 12 1/2 c.
Manganese, 150 mesh	61 c.
Nickel, 150 mesh	51 1/2 c.
Solder powder, 100 mesh	8 1/2 c. plus metal
Tin, 100 mesh	58 1/2 c.
Tungsten metal powder, 98-99%, any quantity, per lb.	\$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	\$2.60
Under 100 lb.	\$3.00

\*Freight allowed east of Mississippi.

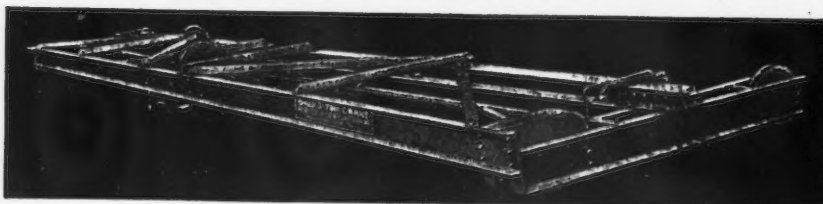
## COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.60

\*Hand drawn ovens using trucked coal permitted to charge \$7.75 per ton plus transportation charges.

# CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED

## ELECTRIC CRANE



Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Head-room Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — \$139.50, 500 lb. — \$149.50, 1000 lb. — \$159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.



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Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.  
Builders Of Conco Torpedo Electric Hoist



## PRICES

### REFRACTORIES

(F.o.b. Works)

#### Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	\$66.55
First quality, Pa., Md., Ky., Mo., Ill.	52.85
First quality, New Jersey	57.70
Sec. quality, Pa., Md., Ky., Mo., Ill.	47.95
Sec. quality, New Jersey	62.55
No. 1 Ohio	44.30
Ground fire clay, net ton	7.80

#### Silica Brick

Pennsylvania and Birmingham	\$52.85
Chicago District	60.65
Silica cement, net ton (Eastern)	9.25

#### Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt.	
Plymouth Meeting, Chester	\$54.00

#### Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

#### Grain Magnesite

Domestic, f.o.b. Balt. and Chester	
in sacks (carloads)	\$43.48
Domestic, f.o.b. Chewelah, Wash.	
(in bulk)	22.00

### RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb.	
No. 1 O.H., gross ton	\$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	Per Gross Ton
Light rails (from billets)	\$40.00
Light rails (from rail steel)	39.00
Base per Lb.	
Cut spikes	3.00c
Screw spikes	5.15c
Tie plate, steel	2.15c
Tie plates, Pacific Coast	2.30c
Track bolts	4.75c
Track bolts, heat treated, to rail-roads	5.00c
Track bolts, jobbers discount	63-5
Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.	
*Add \$3.00 per gross ton to delivered price	
—OPA interim increase, Jan. 11, 1945.	

### CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

#### Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c	20.40c
Bars	25.00c	24.00c
Plates	29.00c	27.00c
Structural shapes	25.00c	24.00c
Sheets	36.00c	34.00c
Hot rolled strip	23.50c	21.50c
Cold rolled strip	30.00c	28.00c
Drawn wire	25.00c	24.00c

#### Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c	16.15c	19.125c	23.375c
Bars	18.50c	19.00c	22.50c	27.50c
Plates	21.50c	22.00c	25.50c	30.50c
Sheets	26.50c	29.00c	32.50c	36.50c
Hot strip	17.00c	17.50c	24.00c	35.00c
Cold strip	22.00c	22.50c	32.00c	52.00c

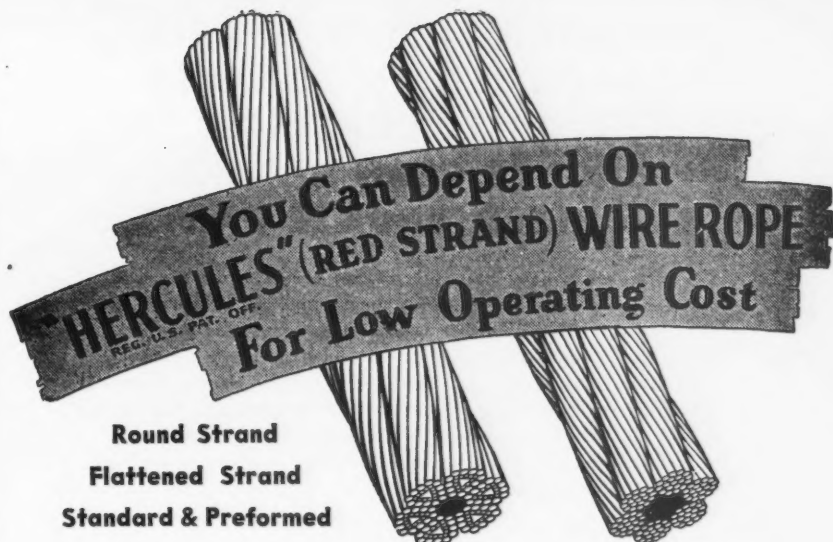
#### Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c*
Sheets	19.00c*
*Includes annealing and pickling.	

### ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c
Armature	3.55c
Electrical	4.05c
Motor	4.95c
Dynamo	5.65c
Transformer 72	6.15c
Transformer 65	7.15c
Transformer 58	7.65c
Transformer 52	8.45c
F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.	



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A shot or grit that will blast fast with a clean finish.

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has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

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S & H Bronze Bearings are made of cast bronze, under the most modern conditions and of specifications to meet the most exacting requirements. We are manufacturers of plain bronze and graphited and oilless bronze bearings for all branches of the Government Services, as well as plain cylinder type, single and double flange, thrust washers, from 3/8" in diameter to 20" in diameter. We also manufacture special parts made of cast bronze. Our manufacturing methods and equipment enable us to meet the most exacting machining specifications.

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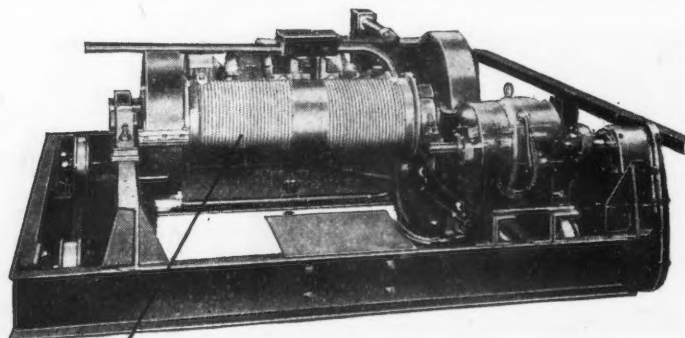
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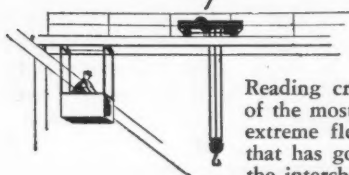
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## PRICES

### Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.  
Carload lots (bulk) ..... \$135.00  
Carload lots (packed) ..... 141.00  
Less ton lots (packed) ..... 148.50  
\$1.70 for each 1% above 82% Mn, penalty, \$1.70 for each 1% below 78%.

### Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.  
96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.  
Carload, bulk ..... 36c.  
L.c.l. lots ..... 38c.  
95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.  
Carload, bulk ..... 34c.  
L.c.l. lots ..... 36c.

### Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.  
16-19% Mn 19-21% Mn  
3% max. Si 3% max. Si  
Carloads ..... \$35.00 \$36.00  
Less ton ..... 47.50 48.50

### Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si ...	6.65c.	7.10c.	7.25c.
75% Si ...	8.05c.	8.20c.	8.75c.
80-90% Si ...	8.90c.	9.05c.	9.55c.
90-95% Si ...	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

### Silvery Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 \$) f.o.b. Jackson, Ohio ..... \$30.50  
Buffalo ..... 31.75  
For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.

### Bessemer Ferrosilicon

Prices are \$1 a ton above silvery iron quotations of comparable analysis.

### Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe. 13.10c.	13.55c.	16.50c.	
97% Si, 1% Fe. 13.45c.	13.90c.	16.80c.	

### Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk. 3.35c.	3.50c.	3.65c.	
2000 lb.-carload ..... 3.8c.	4.2c.	4.25c.	

### Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.  
Carload, bulk ..... 6.05c.  
2000 lb. to carload ..... 6.70c.  
Under 2000 lb. .... 6.90c.  
Briquets, contract, basis carlots, bulk freight allowed, per lb. ... 5.80c.  
2000 lb. to carload ..... 6.30c.  
Less ton lots ..... 6.55c.

### Ferrochrome

(65-72% Cr, 2% max. Si)  
OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C ..... 23.00c.	23.40c.	24.00c.	
0.10% C ..... 22.50c.	22.90c.	23.50c.	
0.15% C ..... 22.00c.	22.40c.	23.00c.	
0.20% C ..... 21.50c.	21.90c.	22.50c.	
0.50% C ..... 21.00c.	21.40c.	22.00c.	
1.00% C ..... 20.50c.	20.90c.	21.50c.	
2.00% C ..... 19.50c.	19.90c.	21.00c.	
66-71% Cr, 4-10% C ..... 13.00c.	13.40c.	14.00c.	
62-66% Cr, 5-7% C ..... 13.50c.	13.90c.	14.50c.	



# FERROALLOY PRICES

## High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

## Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Ton Bulk	Less Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

## Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

## Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.65c.	6.30c.	6.60c.
Carload, bulk	6.65c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

## Calcium-Manganese-Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
16-20% Ca, 14-18% Mn, 53-55% Si. Add 0.25c. for spot sales.			
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.85c.	19.60c.

## Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	\$1.30	\$2.30	\$5.00
Less ton lots	2.30	2.80	5.75

## Chromium-Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot 45c.

## Ferroboreon

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	\$1.20	\$1.2075	\$1.229
Less ton lots	1.30	1.3075	1.329

## Manganese-Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.			
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots	2.01	2.023	2.055

## Nickel-Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 2.00% max. Fe, balance Ni.			
11,200 lb. or more	\$1.90	\$1.9125	\$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

## Other Ferroalloys

Ferrotungsten, Standard grade, lump or 1/4" down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more.... \$1.90

Ferrovandium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va. \$2.70

Open hearth ..... \$2.80  
Crucible ..... \$2.90  
Primos ..... \$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... \$1.50

Vanadium pentoxide, 88%-92% V<sub>2</sub>O<sub>5</sub> technical grade, contract basis, any quantity, per lb. contained V<sub>2</sub>O<sub>5</sub>. Spot sales add 5c. per lb. contained V<sub>2</sub>O<sub>5</sub>..... \$1.10

Silicaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots ..... 35c.

2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots ..... 53c.

2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1 ..... \$7.5c.

No. 6 ..... 60c.

No. 79 ..... 48c.

Borfram, f.o.b. Niagara Falls

Ton lots, per lb. .... 45c.

Less ton lots, per lb. .... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb. 2000 lb. lots ..... \$2.25

Under 2000 lb. lots ..... \$2.30

Ferrotitanium, 40%-45%, 0.10% C, max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti. \$1.23

Less ton lots ..... \$1.25

Ferrotitanium, 20%-25%, 0.10% C, max., ton lots, per lb. contained titanium ..... \$1.35

Less ton lots ..... \$1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload.... \$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalled with Rockdale, Tenn., per gross ton ..... \$58.50

Ferrophosphorus, electrolytic 23-26% carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalled with Nashville, per gross ton ..... \$75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. .... 80c.

Molybdenum oxide briquettes, 48-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo. .... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo. .... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add 1/4c. for spot sales

Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.

Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots ..... 8.00c.

Ton lots ..... 8.75c.

Less ton lots ..... 9.25c.

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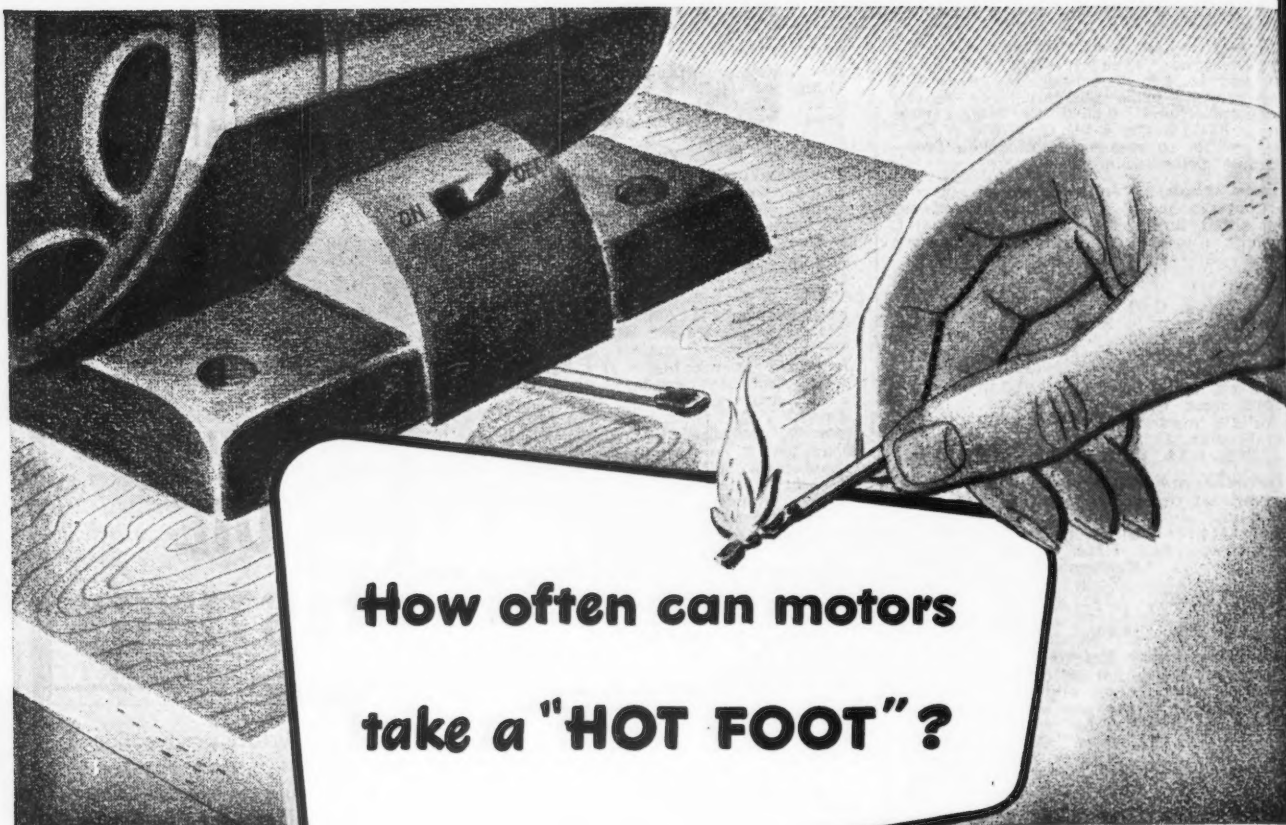
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Specialized cleaning

MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT





## How often can motors take a "HOT FOOT"?

Overloads, dirt, corrosive acids, heat, moisture and the human element can all play tricks on even the best designed motors. Any one, or a combination of them, can give your motor a "hot foot" once too often, then — failure.

Most motors are designed, by experts, to do their specific jobs efficiently. Most of them are built to give trouble-free service and to operate economically. Without the motor manufacturers' design and production skill American industry would be at a standstill today. Yet, the records show that motor failure still imposes an extremely heavy time and dollar loss on every industry.

Fiberglas® Electrical Insulation Materials have proved their ability to protect motors of all types from the conditions which cause a majority of the failures. They provide that "extra" protection which assures longer, more economical operation and decreases down time and its consequent production losses.

**Fiberglas Insulation cuts  
rewind shutdowns**

Typical of the advantages which Fiberglas Insulation provides is this experience of a concern in the metal-working industry.

A manufacturer of automotive parts

was using 3 h-p, squirrel-cage, 3600 rpm motors to drive fans for operator and hot stock cooling. The motors were operated in high ambient temperatures and exposed to dust, grit and metal scale. The motors were failing at sixty-day intervals. Operators complained and the production line was slowed down while motors were being replaced and rewound.

Then these motors were rewound with the same size and type of wire, but with Fiberglas Insulation throughout. They have been in operation for over a year, with no failures to date.

And remember,



the only added cost in rewinding with Fiberglas is the slight difference in the cost of the insulating materials.

Fiberglas Electrical Insulation Materials, in plain and treated forms, are available now. For complete information consult your distributor or write for new catalog. *Owens-Corning Fiberglas Corporation, 1871 Nicholas Bldg., Toledo 1, Ohio. In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.*

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**BE SURE TO SEE THE FIBERGLAS  
ELECTRICAL INSULATION MATERIAL EXHIBIT**

**THE NEXT SHOWINGS ARE:** Bellevue Stratford, Philadelphia, January 30-February 2; Belvedere, Baltimore, February 7-8; Hotel Roosevelt, Pittsburgh, February 19-21; Hotel Statler, Buffalo, February 27-March 1; Biltmore, Dayton, March 7-8; Netherlands Plaza, Cincinnati, March 13-15. Further showings will be announced later.

**ASK FOR FIBERGLAS—IN YOUR NEXT NEW MOTOR—AND ON YOUR NEXT REWIND**

# FIBERGLAS

\*T. M. Reg. U. S. Pat. Off.

**ELECTRICAL  
INSULATION**



**THERE'S A COMPLETE LINE OF FIBERGLAS ELECTRICAL INSULATIONS**

**YARNS • TAPES • CORD • SLEEVING • CLOTH AND OTHER FORMS.** Also available in: Magnet wire, Lead wire, Special wires, Varnished cloth and tape; Mica Combinations; Laminates, Saturated sleeving, Varnished tubing, Pressure sensitive tapes, Special products.